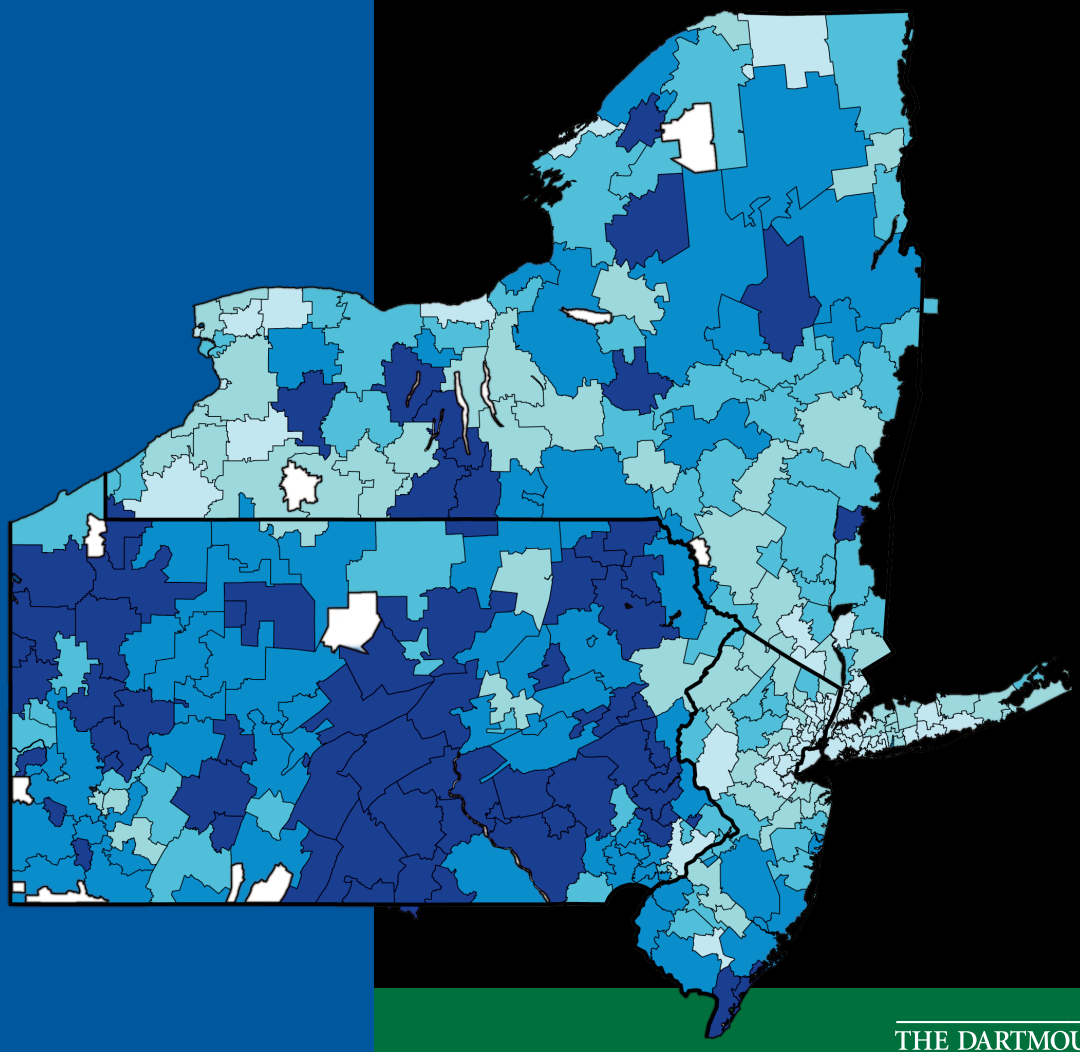
Improving Patient Decision-Making in Health Care:

A 2012 Dartmouth Atlas Report Highlighting the Middle Atlantic Region

A Report of the Dartmouth Atlas Project



THE DARTMOUTH INSTITUTE
FOR HEALTH POLICY & CLINICAL PRACTICE

Where Knowledge Informs Change

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A 2012 Dartmouth Atlas Report Highlighting the Middle Atlantic Region

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Authors:
Shannon Brownlee, MS
John E. Wennberg, MD, MPH
Michael J. Barry, MD
Elliott S. Fisher, MD, MPH
Julie P.W. Bynum, MD, MPH
David C. Goodman, MD, MS

Editor:
Kristen K. Bronner, MA

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A 2012 Dartmouth Atlas Report
Highlighting the Middle Atlantic Region

What This Report Is and How It Can Be Used

For patients whose conditions can be treated with elective surgery, location matters. In this Dartmouth Atlas report, the second in a series of nine U.S. regional reports, we show the wide regional variation in the likelihood that patients with similar conditions receive elective procedures. This report highlights the Middle Atlantic region (New Jersey, New York, and Pennsylvania) and shows the variation across the region and the United States. For example, if you have heart disease and live in York, Pennsylvania, you are half as likely to undergo balloon angioplasty than if you live in New Brunswick, New Jersey, and twice as likely to undergo back surgery than if you live in Philadelphia. If you have osteoarthritis of the knee and live in Camp Hill, Pennsylvania, you are three times more likely to have your knee replaced than if you live in Brooklyn.

Variations of a similar magnitude were found across the region for other procedures as well. Among the largest 30 communities in the Middle Atlantic region, we found fivefold variation in radical prostatectomy and more than fourfold variation in carotid endarterectomy, a procedure performed to prevent stroke. The greatest variation was seen in the use of prostate-specific antigen (PSA) testing to screen for prostate cancer. Among the 30 largest communities, rates of PSA testing varied an astonishing tenfold, ranging from a low of 6% of male Medicare beneficiaries in Binghamton, New York to 60% of men in Manhasset, New York.

In highlighting the variation from community to community for these and other elective procedures, we hope to help patients, families, and clinicians—physicians, nurses, and other health care providers—better understand both the importance of these variations and their major cause: the fact that patients' preferences are not always taken into account when medical decisions are made. This report is intended to encourage patients and their families to make sure they are fully informed about their choices and to share important health care decisions with their clinicians.

All too often, patients facing the possibility of elective surgery are not given an opportunity to understand their options fully. Many patients are not even aware that the decision about elective surgery is actually a choice and that it should generally be theirs to make. Instead, they routinely delegate such important, even life-altering decisions to their clinicians in the belief that "the doctor knows best." The result is that patients often do not get the treatment that they would prefer. Research suggests that for many conditions—especially those that can be treated with elective surgery—the treatment a patient receives depends more on the physician's recommendations than the patient's preferences.[1]

Clinicians are not mind readers. They often do not know or ask their patients about their values and preferences; or they may assume that the patient's values are similar to their own. As a result, they may recommend treatment that is different from what their patients would have chosen had they been fully informed.[2,3] Clinicians also vary widely in their opinions about the best course of treatment for any given condition.

These differences in clinicians' personal beliefs and opinions contribute to the variation in surgical rates in different geographic locations. For example, there is considerable disagreement among surgeons about the need for back surgery, its effectiveness, and even the best way to diagnose the cause of back pain. With no consensus about how to diagnose and treat back pain, the rate of back surgery varies widely from place to place.

This report, a collaborative project with the Informed Medical Decisions Foundation, looks at the variation in surgical rates in 306 hospital referral regions across the United States (a hospital referral region is a large health care market containing at least one referral hospital). In the Appendix, patients can find the rates for ten different surgical procedures and one test in 31 different hospital referral regions and 326 hospital service areas in the Middle Atlantic region (a hospital service area encompasses the geographic area served by a relatively small number of hospitals). Other editions will look at variation in the rates of these procedures in other regions. Data for the entire nation, encompassing more than 3,400 hospital service areas, can be found on the Dartmouth Atlas web site (www.dartmouthatlas.org).

This report is divided into three parts. The first section, "The Importance of Choice in Health Care," explains the concept of shared decision-making, a process that helps patients understand their choices fully and allows them to share treatment decisions with their clinicians. The second section, "Variation in Preference-Sensitive Care," briefly describes the treatment choices facing patients with eight different conditions, all of which can—but do not have to be—treated with surgery.

The last section, "Ensuring Patients Get the Care They Need and Want," discusses steps patients can take to make sure they get the care they want and need. It also discusses how physicians and other clinicians can support shared decision-making to ensure that patients make fully informed choices. When done right, shared decision-making results in a better decision: a personalized choice based on the best scientific evidence and the patient's own values.

The Importance of Choice in Health Care

Medicine involves decisions. Traditionally, patients have relied on their clinicians—physicians, nurses, and other health care providers—to decide for them: to prescribe tests, surgeries and drugs; to refer them to specialists; and to admit them to hospitals and intensive care units. But some of the most important choices in medicine are not the clinician's alone to make. These decisions should be shared with patients.

The patient's preference for the kind of care he or she wants is especially important when facing a test, surgery, or other treatment that is "elective." When a treatment is elective, it means there is more than one way to treat the patient's illness or condition, each possible treatment involves different trade-offs, and individual patients will view those trade-offs differently. Sometimes, doing nothing at first—"watchful waiting"—may be a completely reasonable option.

In order to ensure that each patient gets the treatment that is right for him or her, the choice should be a shared decision, involving both the patient and the clinician. In the process known as "shared decision-making," the patient is a fully informed partner in the choice, knowledgeable about the risk and benefit trade-offs of each treatment option. When done right, shared decision-making results in a better decision: a personalized choice based on both the best scientific evidence and the patient's own values.

For example, consider the importance of shared decision-making to women who have early-stage breast cancer. For most women with this condition, the options are mastectomy, which involves surgical removal of the entire breast, or lumpectomy, which is local excision of the tumor followed by radiation. Clinical trials have shown that the two treatments are the same in terms of a woman's chances of surviving her cancer, but they are obviously very different in terms of their effect on her body and possibly her sense of well-being.

For women who choose lumpectomy, there is a higher risk that the cancer will recur in the same breast. To reduce this risk, most patients who have a lumpectomy also undergo radiation treatment. Women who elect mastectomy do not need to worry as much about a local recurrence, but mastectomy is more disfiguring, and women who choose it will have to undergo more surgery if they wish to have the breast reconstructed. Women who have lumpectomy also may need more than one operation to be sure all of the tumor is removed, and they will usually need weeks of radiation treatment. Different women will prefer one option or the other, depending upon how much they value preserving their breast, their willingness to undergo radiation or more invasive surgery, and the level of uncertainty they are willing to live with in terms of their cancer recurring.

Elective tests, procedures, and surgeries like mastectomy and lumpectomy are used to treat conditions that are considered "preference-sensitive."[i] For such con-

[i] For preference-sensitive conditions, the rate at which a procedure occurs is sensitive to, or driven by, somebody's preference. In the absence of shared decision-making, it is often the doctor's preference that determines treatment, rather than the patient's.

ditions, medical ethics requires that the patient be given the opportunity to help make a fully informed choice: to look at the various options and select one with her clinician based on her personal values and a sound understanding of the available medical evidence. When patients do not have a chance to make a fully informed choice, clinicians are at risk of prescribing the wrong treatment to a patient: a treatment that the patient would not have wanted had she been fully informed and given the opportunity to share the decision.

The link to practice variation

Patients facing elective procedures—such as surgeries and tests—are not always given the chance to understand their choices and share the decision with their clinicians. A recent study found that most patients were poorly informed about the potential risks and benefits offered by a wide variety of treatments recommended by their clinicians, and clinicians did not ensure that their patients fully understood their options.[2] Other studies have shown that patients who *are* given the opportunity to fully understand their options often make different choices than patients who are not fully informed.[4]

Research suggests that for many preference-sensitive conditions—especially those that can be treated with elective surgery—the treatment a patient receives depends more on the physician's recommendation than the patient's preferences.[1] This is due in part to the fact that many patients are not even aware that the decision about elective surgery is in part theirs to make, and they routinely delegate the decision to undergo surgery to their surgeons in the belief that "the doctor knows best."

Many patients do not realize that their clinician does not always fully understand their values and preferences. When this happens, the clinician's treatment recommendations may be different from what their patients would have chosen had they been given the opportunity to be fully informed.[2] Many clinicians are not accustomed to involving their patients in treatment decisions in a meaningful way and thus cannot be sure which treatment their patients would prefer.[3,5] Clinicians also vary widely in their opinions about the best course of treatment; one surgeon may believe one procedure is best, while another favors a different approach. This is the case more often than patients might think. There are gaps in medical knowledge, and sometimes the scientific evidence is not yet sufficient to clarify which treatment is safest and most effective for a given condition in an individual patient.[6] Even when the risks and benefits of a treatment are well documented, physicians have their own beliefs about what matters most and often value the possible treatment options differently than would their patients.

These differences in clinicians' personal beliefs and opinions lead to differences in the kinds of treatment patients receive in different geographic locations. For example, there is considerable disagreement among surgeons about the need for back surgery, its effectiveness, and even the best way to diagnose the cause of back pain. This lack of agreement stems in part from a lack of studies, called clinical trials, which provide the scientific evidence that clinicians need in order to know how best

WHAT IS A RATE?

A rate measures how often something happens in a defined population. In medicine, a rate is usually expressed as the number of events (procedures, tests, etc.) that happen in a given group of people over a given period of time (the numerator), divided by the total number of members of the group (the denominator) during that period. For example, if there are 1,000 people in a group, and 15 of them undergo back surgery in one year, the rate of back surgery is 15 per 1,000 for that year. This can also be expressed as a rate of 1.5% (or 1.5 per 100). In this report, the rates are usually based on the number of procedures performed on Medicare beneficiaries divided by the total number of Medicare beneficiaries who live in a given geographic area. Most of the rates in this report are expressed as the number of procedures per 1,000 beneficiaries in 2010; some are averaged over a three-year period, 2008 to 2010.

These rates have been adjusted for age, sex, and race. This means that demographic factors that might affect how common a condition is have been taken into account. For example, communities where Medicare beneficiaries are older, on average, tend to have more heart disease. That could affect the rate of cardiac bypass surgery, because we would expect that communities where heart disease is more common would have more bypass surgery. Adjusting for age (and for sex and race, which can also affect the amount of disease) makes it unlikely that the variation we see in rates of cardiac bypass surgery in different communities is due to differences in the age composition of the population and thus to different rates of heart disease itself. In essence, these adjustments make the results what they would be if there were no age, sex, or race differences between areas.

Knowing the rate at which a particular procedure occurs among local communities is a way to compare the average chance of undergoing that procedure, depending on where one lives. For example, in 2010, the average rate of back surgery among Medicare beneficiaries living in and around Ocala, Florida was 9.4 per 1,000 beneficiaries, one of the highest rates in the nation. The rate in and around Terre Haute, Indiana was 2.4, about a quarter of the rate in Ocala. That means a resident of Ocala was four times more likely to undergo back surgery than a resident of Terre Haute. Another way to judge the chance of undergoing a procedure is to compare the rate in a given community against the U.S. average. The rate of back surgery in Ocala was twice the U.S. average.

to treat their patients. With no consensus about how to diagnose and treat back pain, the rate of back surgery varies a great deal from place to place.[ii]

On the other hand, when clinicians agree on how to treat a condition, there is often relatively little geographic variation in the care patients receive. Take the example of hip fracture. Diagnosing a broken hip is not difficult, and all physicians agree that patients with a broken hip must be hospitalized and undergo a procedure to repair it. Moreover, patients who break their hips always seek medical care. Thus the rate of hospitalization for hip fracture is a reflection of the rate of hip fracture itself; and this does not vary much from place to place. What variation does exist can be considered justified, or warranted, because it can be explained on the basis of the rates at which hip fractures actually occur in populations.

[ii] The wide variation in rates of surgeries, tests, and other procedures can be due to the opinions of a relatively small number of physicians in a community. This was seen in Vermont in the 1970s, where rates of tonsillectomy varied widely in towns that were only a few miles apart. In the town of Waterbury, for example, less than 20% of children had undergone a tonsillectomy by age 15. In nearby Morrisville, more than 60% of children had had their tonsils removed by that age. Two physicians in Morrisville were responsible for the high rate of tonsillectomy there. When the physicians in Morrisville learned that children in their town were far more likely to undergo the surgery than in the rest of the state, they decided to seek a second opinion before recommending the surgery. Two years later, the rate of tonsillectomy in Morrisville dropped to 10%.[22]

Where you live is what you get

The rates of use of most surgical procedures vary to a much greater extent than the rate of hospitalization for hip fracture. What this means is, if you are a patient with a surgical condition—a disease or condition that can be treated surgically—your chances of having surgery depend in large measure on where you live and which clinicians you happen to see. In health care, to a remarkable degree, geography is destiny.

Previous editions of the Dartmouth Atlas have documented striking variations in the rates of use of elective surgery among the 306 hospital referral regions (HRRs) in the United States.[iii] This edition of the Atlas, which is a collaborative project with the Informed Medical Decisions Foundation (see box), not only looks at the variation in care delivered in HRRs; it also contains information about the care delivered in much smaller areas, known as hospital service areas (HSAs), which generally encompass geographic areas served by a relatively small number of hospitals.[iv] The Foundation, through its medical editors, is responsible for the information regarding the treatment options for the conditions discussed in this report. The Dartmouth Atlas Project is responsible for the analysis of the data on practice patterns.

By focusing on both hospital referral regions and hospital service areas, this report offers individuals information about their chances of undergoing ten surgeries and one cancer screening test, depending upon where they live. The information on treatment options and local rates of use is intended to help clinicians, patients, and families understand both the importance of patients' preferences in making medical decisions and the (sometimes wide) variation in rates of these procedures in their local communities. Through this understanding, we hope to encourage patients and their families to make sure that they are given the chance to be fully informed and to share important health care decisions with their clinicians.

The following section, "Variation in Preference-Sensitive Care," provides information about eight different preference-sensitive conditions. It describes the treatment options and highlights the trade-offs that patients face in choosing between them. It describes the variation in the rates at which ten surgical treatments and one test were delivered in the 306 HRRs around the country during either 2010 or the period from 2008 to 2010.[v] For information about the rate of each procedure or test in each HRR and HSA in the Middle Atlantic region, please see the Appendix Tables. The data are also available on the Dartmouth Atlas web site (www.dartmouthatlas.org).

[iii] Hospital referral regions are large health care markets that include at least one large referral hospital, such as an academic medical center, as well as other community hospitals. For a more complete definition of a hospital referral region, go to www.dartmouthatlas.org.

[iv] Hospital service areas are defined by patterns of use of local hospitals. Most contain only one hospital; and most hospital referral regions contain a number of hospital services areas. See the Appendix on Methods for details on this and other points of methodology.

[v] For three procedures that were performed relatively less frequently than the others in an inpatient setting, we averaged the rates over a three-year period, 2008 to 2010. Using three years' worth of data improves the statistical precision of the rates and increases the number of regions for which we can report reliable data.

THE INFORMED MEDICAL DECISIONS FOUNDATION

The Informed Medical Decisions Foundation (www.informedmedicaldecisions.org) is a non-profit organization dedicated to increasing patient involvement in health care decision-making. Health Dialog Services Corporation (Health Dialog) was created to disseminate the material and insights developed by the Foundation. The licensing agreement between the Foundation and Health Dialog, its production and distribution partner, provides royalties as well as contract funding to develop and maintain Shared Decision-Making® Programs and other decision support materials. Health Dialog is a private, wholly owned subsidiary of Bupa, a global health and care company headquartered in London, England.

Different readers will find the next section useful for different purposes. Patients with one of the conditions discussed may realize that they want to know more before they make a decision about how they want to be treated. This section may also raise questions patients might want to ask their clinicians in order to help them choose the treatment that is right for them.

The variation in rates of different treatments can also inform clinicians, who are often unaware that the care in their medical community may differ from that in other communities. It can also serve as a reminder to the medical profession of the importance of fully informing patients about their treatment choices as an ethical standard for clinical decision-making.

The final section, “Ensuring Patients Get the Care They Need and Want,” discusses steps patients can take to make sure they get the care they want and need—and no more. It also discusses ways physicians and other clinicians can support shared decision-making, to ensure that patients make fully informed choices and to reduce unwarranted variation in medical practice.

A word of caution: the conditions discussed in this report by no means represent an exhaustive list of all the preference-sensitive treatments and tests that vary in their rates of use in different communities. There are many more decisions about elective procedures and treatments that patients and clinicians should share. Many decisions—such as prescribing drugs and undergoing screening tests—should be shared between well-informed patients and their clinicians. Patients should also be cautioned against considering the information about individual conditions and possible treatments presented in this report as sufficient for making decisions about preference-sensitive care. Patients should go to their clinicians for more information.

Variation in Preference-Sensitive Care

The information in this section summarizes the major treatment options available for most patients with one of eight preference-sensitive conditions:

- Early-stage breast cancer (treatment)
- Stable angina (chest pain due to coronary artery disease)
- Low back pain
- Arthritis of the knee or hip
- Carotid artery disease
- Gallstones
- Enlarged prostate (benign prostatic hyperplasia)
- Early-stage prostate cancer (screening and treatment)

Readers can find an overview of each condition, prepared under the guidance of the Informed Medical Decisions Foundation. Each overview summarizes the major treatment options and the trade-offs patients face. Readers can also find a map showing the variation in surgery rates in the 306 HRRs for each condition, prepared by the Dartmouth Atlas team. Each map shows the variation across the U.S. and indicates the chances of receiving one treatment or another, depending upon location. To find out the rate for each procedure in your community, go to the Appendix Tables, which show the rates for the 31 hospital referral regions and 326 hospital service areas in the Middle Atlantic region. Rates for all HRRs and HSAs are available at the Dartmouth Atlas web site (www.dartmouthatlas.org).

The surgical rates are for procedures performed either during the calendar year 2010 or during the period from 2008-10 for patients enrolled in traditional (fee-for-service) Medicare. These are the most recent dates for which Atlas data are available. All data are based on Medicare claims, and rates are age, race and, when appropriate, sex adjusted (see the Appendix on Methods). Although studies in Michigan, California, and Louisiana suggest that the variations in rates among communities are similar for patients under 65, data are not yet available in most parts of the country.

A word about the study population. Variation in the procedure rates presented in this report was measured across a national sample of fee-for-service Medicare beneficiaries (the denominator in rate calculations). While this population includes a mixture of illness types—different stages of breast cancer, for example—most of the variation in procedure rates occurs within the population diagnosed with the above listed illnesses. An exception is that prostate cancer screening (prostate-specific antigen testing) was measured in men without any evidence of prior prostate disease.

Early-Stage Breast Cancer

Early-stage breast cancer is the second most common cancer among women (after lung cancer). Most early-stage breast cancers are curable, and women have a choice between two equally effective surgical treatments. The majority of women treated for early-stage breast cancer will die of some other cause.

How early-stage breast cancer is diagnosed and treated

Early-stage breast cancer is most often diagnosed with a biopsy (removal and examination of a small sample of breast tissue) following a screening mammogram, and patients must choose between mastectomy and lumpectomy. Mastectomy removes the entire breast. Lumpectomy, also known as breast-conserving surgery, removes only the tumor and a bit of surrounding tissue. Women who choose lumpectomy usually receive radiation therapy after surgery to reduce the risk that the tumor will recur in the same location. Most women who undergo mastectomy do not have radiation treatment. For almost all women with early-stage breast cancer, mastectomy and lumpectomy followed by radiation are equally effective in reducing their chances of dying of breast cancer.

Patient choices

Since both modes of treatment offer the same odds in terms of reducing a woman's risk of death from breast cancer, which treatment she chooses depends upon her feelings about her appearance after surgery, the time and energy required for each treatment option, and the risk of a local recurrence. Mastectomy usually involves one operation and reduces the worry that the cancer might recur in the same breast. Women who choose mastectomy must also decide if they want to undergo breast reconstruction.

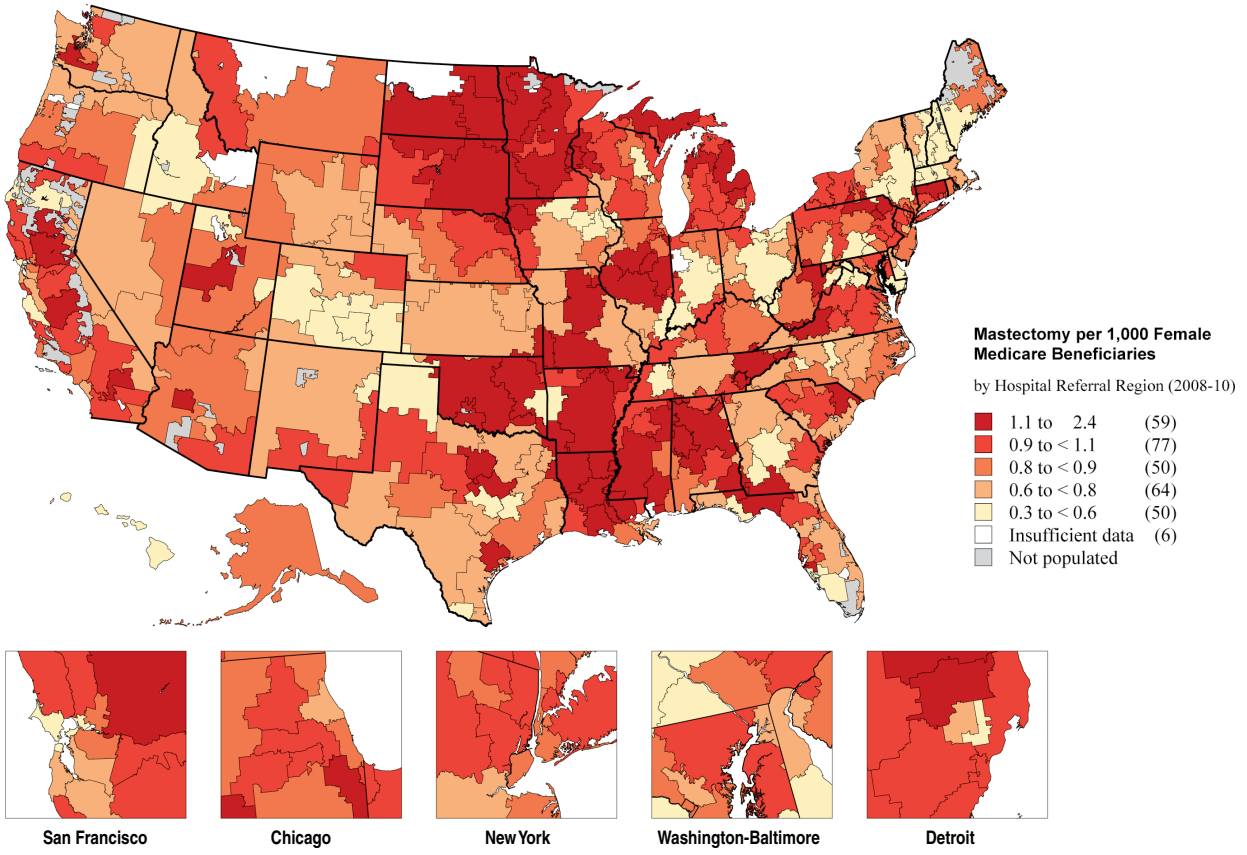
Women who value their breasts highly, and who can accept a slightly higher chance of cancer coming back in the treated breast, may decide to choose lumpectomy, which can sometimes be done under local anesthesia in the surgeon's office. Lumpectomy may require more than one surgery to ensure that all of the cancer has been removed. Women who choose lumpectomy usually undergo radiation therapy. This may involve multiple trips to the hospital or clinic. Radiation reduces—but does not eliminate—the chance that cancer will return in the treated breast, and it is not safe for some breast cancer patients. Women who feel they would have greater peace of mind if the breast is removed, or who do not want to undergo radiation treatment, may decide that mastectomy is a better choice.

There was a high degree of variation in rates of mastectomy across the U.S. during the period 2008-10 (Map 1). This variation is a reflection of several factors that go into the choice between mastectomy and lumpectomy. Physicians have different views about which surgery they recommend, and their opinions do not always take into account what patients want. In recent years, some breast surgeons have moved away from performing mastectomies in the belief that lumpectomies are better for most women, regardless of whether patients prefer it. At least one study has found a gap between what women with early breast cancer value and what their physicians and nurses think patients want. [7]

Early-Stage Breast Cancer

Patients also vary in their choices. Some studies have found that the choice of lumpectomy is strongly associated with more years of formal education. Another way of saying this is that more educated women may be less likely to choose mastectomy. But other studies have shown that women who participate in the decision about breast surgery are *more* likely to choose mastectomy than women whose surgeons make the decision.[8,9]

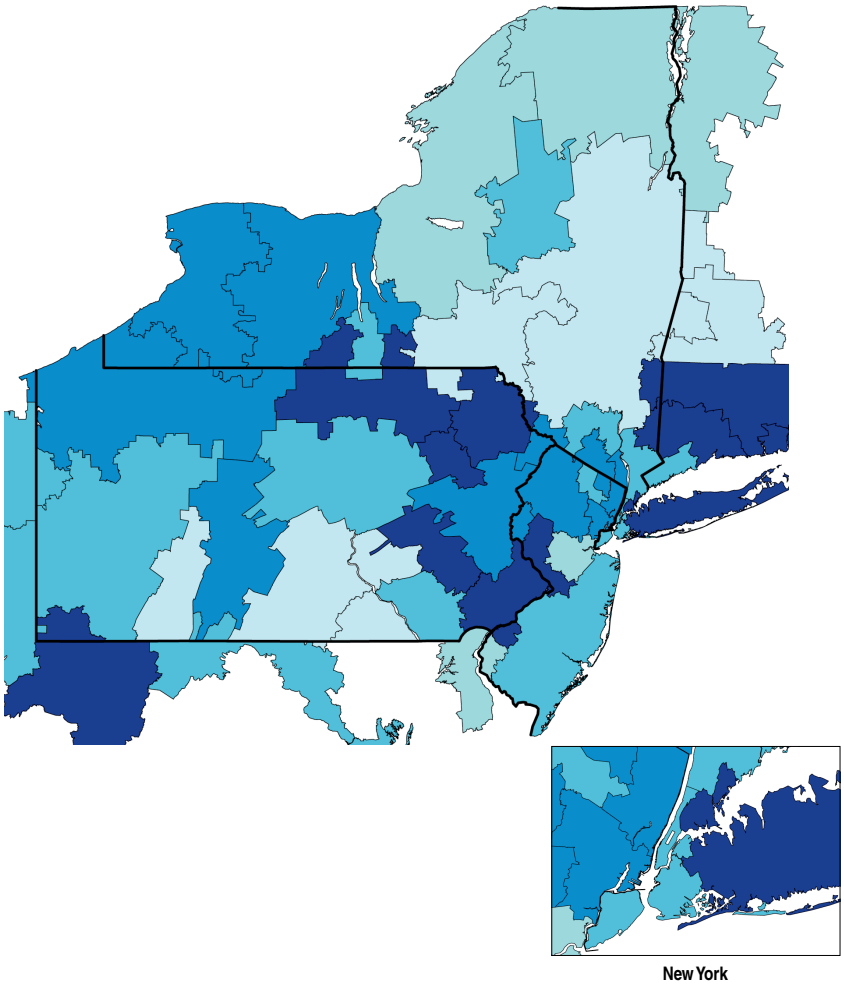
The person in the best position to decide which surgery to undergo is the patient. Women who are active participants in the decision about how to treat early-stage breast cancer are more satisfied with their treatment than women who are not active participants, regardless of which treatment they received.[8,9]



Map 1. Mastectomy per 1,000 female Medicare beneficiaries among hospital referral regions (2008-10)

The colors on the map represent the rates of mastectomy (surgical removal of the breast) per 1,000 female Medicare beneficiaries in each of the 306 HRRs. Rates are adjusted for age and race. The highest rate, 2.3 surgeries per 1,000 female Medicare beneficiaries, was seen in the Grand Forks, North Dakota HRR. The lowest rate, 0.3 surgeries per 1,000, was seen in the San Francisco HRR. In other words, women over 65 living in Grand Forks were more than seven times more likely to undergo mastectomy for early-stage breast cancer than women living in San Francisco. The average rate of mastectomy was 0.9 per 1,000 in the entire U.S.

The greatest variation within a single region was seen in Seattle, where the rate of mastectomy ranged from 0.3 per 1,000, in the Bellevue HSA to 1.2 per 1,000 in the Bremerton HSA.



Mastectomy per 1,000 Female Medicare Beneficiaries

by Hospital Referral Region (2008-10)

- 1.0 to 1.7 (10)
- 0.9 to < 1.0 (9)
- 0.8 to < 0.9 (11)
- 0.6 to < 0.8 (4)
- 0.3 to < 0.6 (6)

Map 2. Mastectomy per 1,000 female Medicare beneficiaries among hospital referral regions in the Middle Atlantic region (2008-10)

Among the HRRs in the Middle Atlantic region, rates of mastectomy ranged from a low of 0.4 in the York, Pennsylvania HRR to a high of 1.6 in the Sayre, Pennsylvania HRR, a fourfold variation.

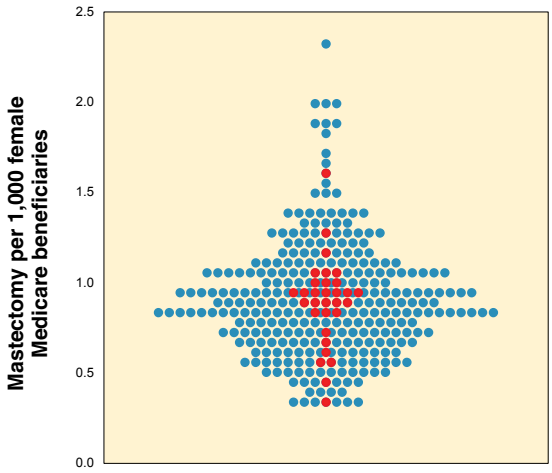


Figure 1. Mastectomy per 1,000 female Medicare beneficiaries among hospital referral regions (2008-10)

Each blue dot represents the rate of mastectomy in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Stable Angina

The coronary arteries supply blood to the heart muscle. Fatty deposits, called plaques, sometimes form inside the arteries; this is called coronary artery disease. If the plaques narrow the artery enough that it is unable to deliver enough oxygen to the heart muscle, patients can experience chest pain called angina.

There are two types of angina. A person is said to have "unstable angina" if he or she has pain that is unpredictable, unexpected, or difficult to control. This type of angina is an emergency and can signal a heart attack. However, chest pain that occurs at predictable times, such as with exertion—walking up stairs, for example, or lifting something heavy—is called "stable angina." The severity and associated disability can vary, but stable angina is usually relieved by resting or taking nitroglycerin.

How stable angina is diagnosed and treated

Once an emergency (like a heart attack) has been ruled out, it is important to determine the cause of the chest pain. Several conditions that have nothing to do with the heart can cause chest pain, such as severe heartburn or chest muscle strain. Tests may be done to determine if the chest pain is due to coronary artery disease, often starting with an exercise stress test.

Once coronary artery disease is diagnosed, even when there is no angina, patients are offered medical therapy to reduce their chances of a heart attack and death. Medical therapy typically combines lifestyle changes—such as quitting smoking, losing weight, and exercising—with drugs to control blood pressure, manage cholesterol, and prevent blood clots from forming. Patients who have stable angina are often given additional drugs to reduce its frequency and discomfort. For some, medical therapy alone provides complete relief from stable angina.

Clinicians may also recommend more invasive procedures for patients with coronary artery disease. One procedure is balloon angioplasty with stents, which involves threading a small tube into the heart vessel (coronary artery) with the fatty blockage, or plaque. A tiny balloon is inflated inside the tube, compressing the plaque against the wall of the vessel, and then leaving behind another small tube—called a stent—to keep the vessel open. This and related procedures are often referred to as percutaneous coronary intervention (PCI). When used in addition to medical therapy, PCI can provide greater relief from angina than can medical therapy alone. However, the procedure also has short-term risks; it can sometimes cause heart attacks, strokes, or even death. Another procedure to treat large blockages, called coronary artery bypass surgery (CABG), is even more effective at relieving stable angina, although it has more short-term risks and requires a hospital stay and recovery period.

For most people, meaning those without severe disease, PCI and CABG do not prevent heart attacks or improve survival compared to medical therapy alone. These procedures treat large blockages—the ones that typically cause angina—while heart attacks are often caused by blockages from smaller plaques. However,

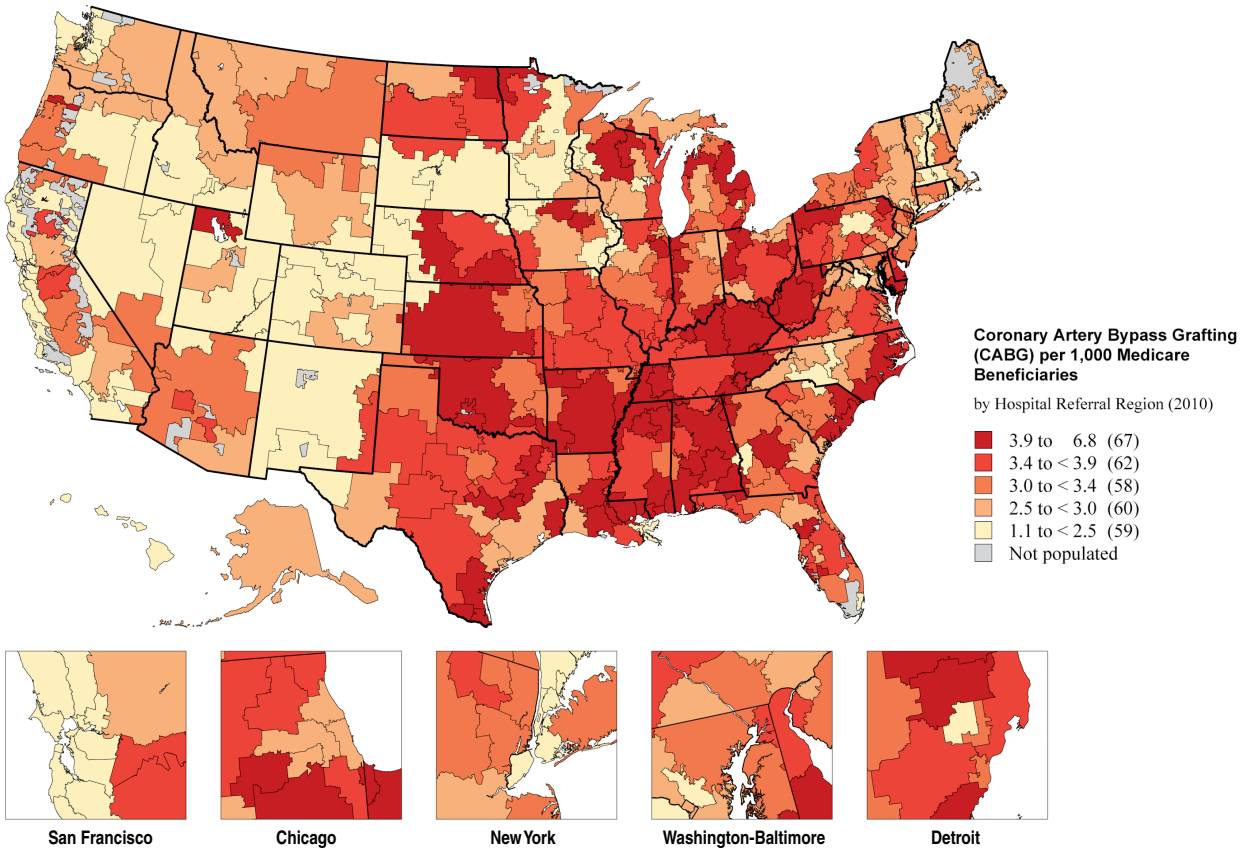
for people with severe disease (those with large blockages in critical arteries, or large blockages in addition to either heart failure or diabetes), PCI and CABG do improve survival compared to medical therapy alone.

Patient choices

While all patients with stable angina will need to take medications, patients can choose whether to have PCI or CABG in addition to their prescriptions. For those who do not have severe disease—the majority—these procedures will not, on average, prolong survival, so for these people, the decision may be about how they feel about their angina. If medical therapy cannot adequately address their angina symptoms, they may look to a procedure. The patient will have to weigh the increased likelihood of angina relief against the potential risks and burdens of the procedures. People with severe disease also have the survival benefit of PCI and CABG compared to medical therapy alone to consider. The trade-offs may vary depending on the person; for instance, people with diabetes are more likely to experience harm during CABG. It is also important to realize that people may not know whether or not they have severe disease unless they choose to have additional tests, which have their own short-term risks.

Physicians do not always agree on the best course of treatment for patients with stable angina, which is reflected in the degree of variation in rates; rates of CABG varied more than fivefold across HRRs (Map 3), and rates of PCI varied more than sevenfold (Map 5). Some believe that, compared to medical therapy alone, heart procedures prolong survival, even in people without severe disease. Many patients also have a difficult time understanding why a procedure that opens blood vessels would not be the best option.[10] The decision on how to treat stable angina is best shared between the patient and the physician. The doctor can help the patient understand the pros and cons of each treatment choice for their particular situation: for instance, how their diabetes influences the trade-offs in benefit and risk. But only the patient knows how bothersome the symptoms are and how he or she feels about the pros and cons of each treatment option. For some people, a few angina attacks are tolerable, as long as the pain can be relieved with rest or nitroglycerin. For other people, the possibility of greater angina relief makes the short-term risks of PCI and CABG worth taking.

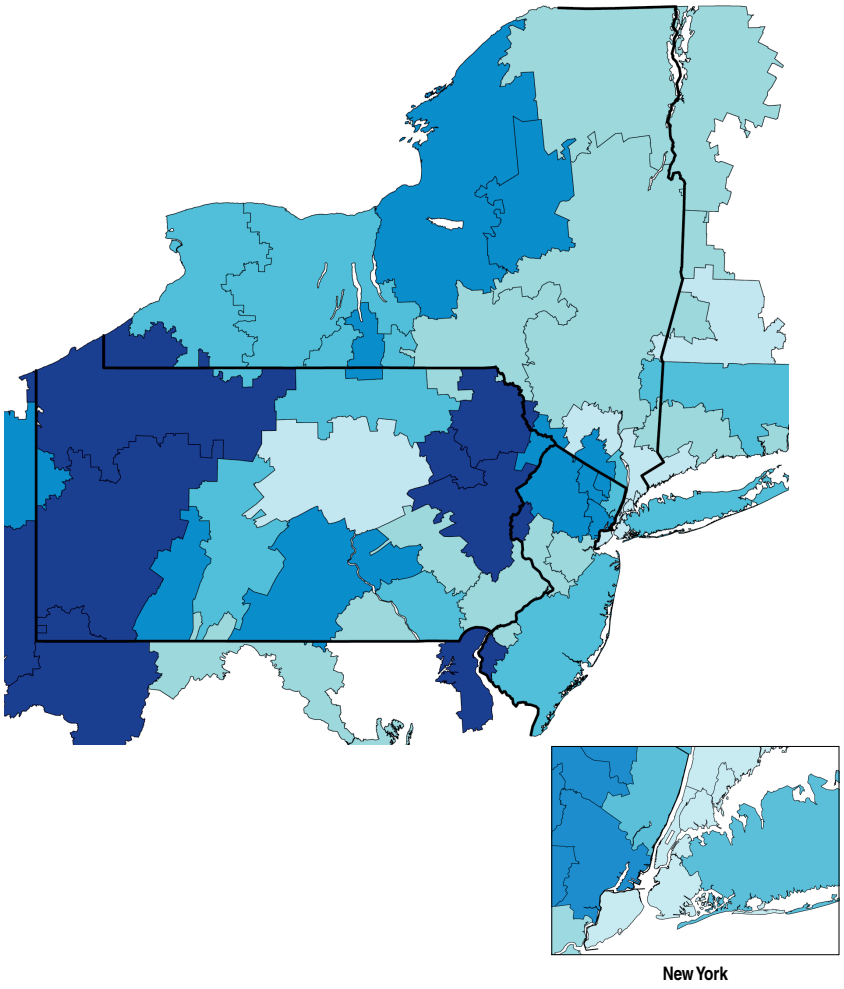
Stable Angina



Map 3. Coronary artery bypass surgery (CABG) per 1,000 Medicare beneficiaries among hospital referral regions (2010)

The colors on the map represent the rates of CABG surgery per 1,000 Medicare beneficiaries in each HRR. Rates are adjusted for age, sex, and race. The highest rate, 6.8 procedures per 1,000 beneficiaries, was seen in the Hattiesburg, Mississippi HRR. The lowest rate, 1.2 procedures per 1,000, was seen in Grand Junction, Colorado. In other words, patients in the Hattiesburg HRR were more than five times more likely than patients in the Grand Junction HRR to undergo CABG during 2010. The national average rate of CABG was 3.2 per 1,000.

The greatest variation within a single HRR during the period 2008-10 was seen in Dallas, where the rate of CABG surgery ranged from 1.3 per 1,000 beneficiaries in the Grapevine HSA to 9.3 per 1,000 in the Paris HSA.



Coronary Artery Bypass Grafting (CABG) per 1,000 Medicare Beneficiaries

by Hospital Referral Region (2010)

- 3.6 to 4.5 (7)
- 3.3 to < 3.6 (9)
- 3.0 to < 3.3 (9)
- 2.6 to < 3.0 (9)
- 1.7 to < 2.6 (6)

Map 4. Coronary artery bypass surgery (CABG) per 1,000 Medicare beneficiaries among hospital referral regions in the Middle Atlantic region (2010)

The rate of CABG varied by a factor of more than two in the Middle Atlantic region, from 1.9 in the Manhattan HRR to 4.1 in Erie, Pennsylvania.

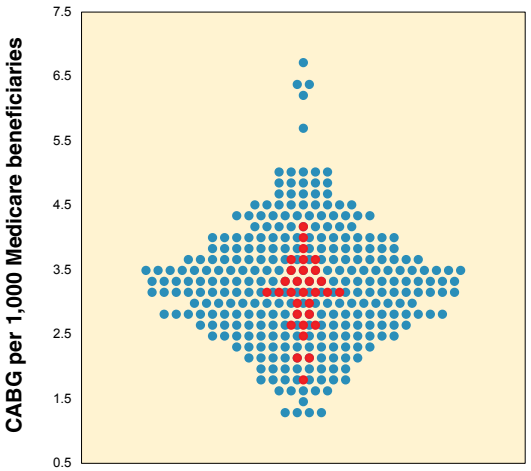
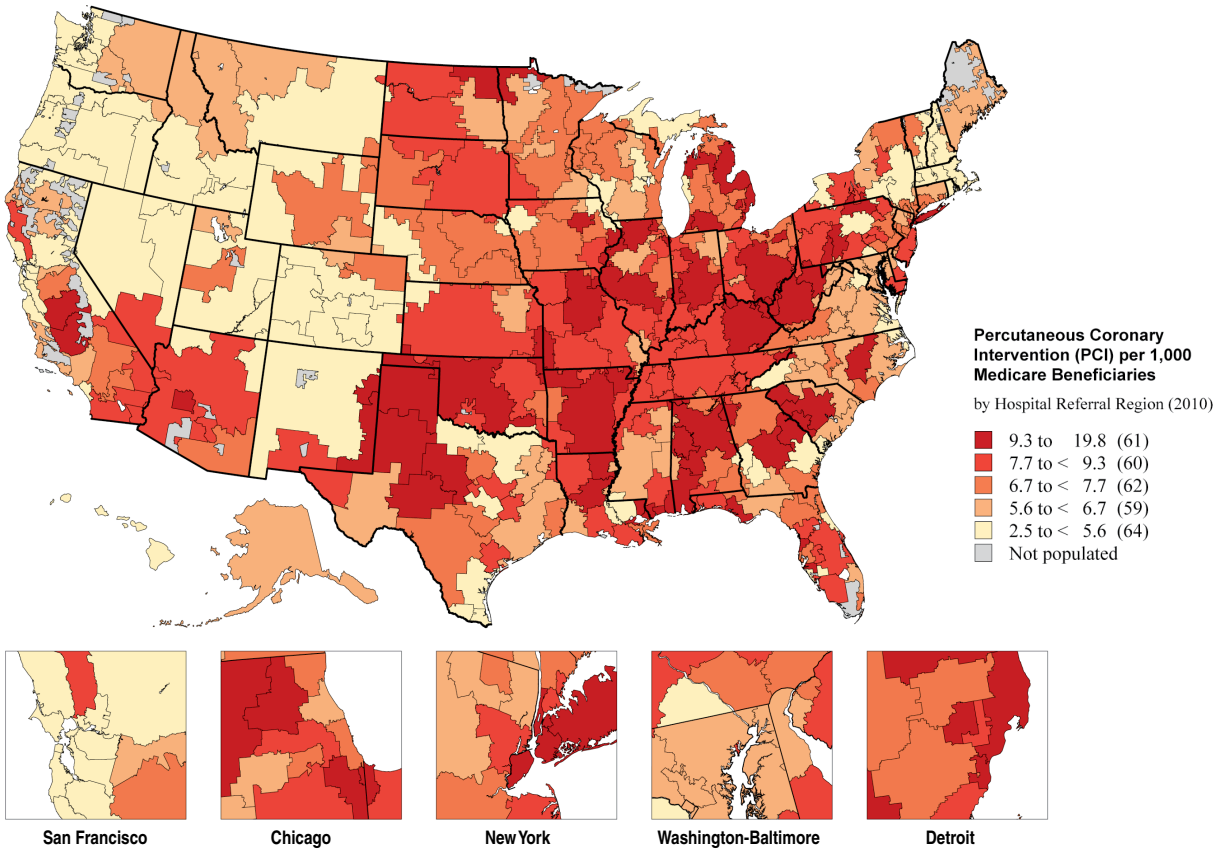


Figure 2. Coronary artery bypass surgery (CABG) per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each blue dot represents the rate of CABG in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region

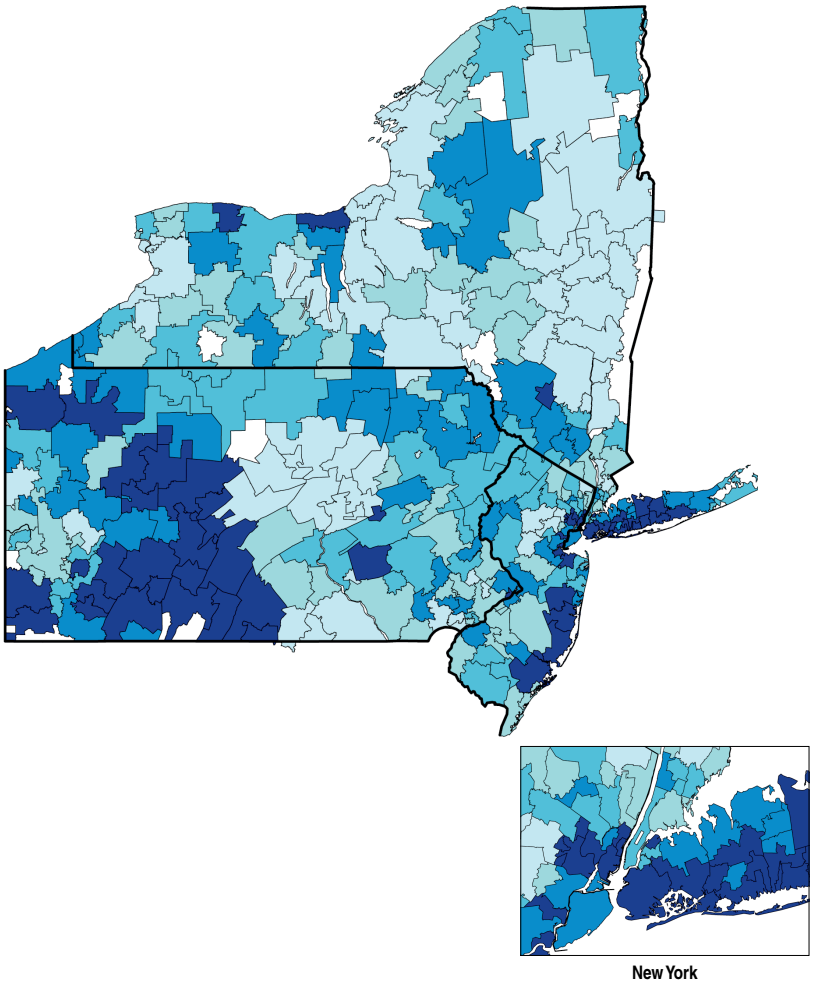
Stable Angina



Map 5. Percutaneous coronary intervention (PCI) per 1,000 Medicare beneficiaries among hospital referral regions (2010)

The different colors represent the rates of PCI per 1,000 Medicare beneficiaries in each HRR. Rates are adjusted for age, sex, and race. The highest rate, 19.8 procedures per 1,000 beneficiaries, was seen in the Elyria, Ohio HRR. The lowest rate, 2.6 procedures per 1,000, was seen in the Honolulu HRR. Medicare beneficiaries living in the Elyria HRR were more than seven times more likely to undergo PCI than beneficiaries living in Honolulu. The rate in Elyria was also more than twice the average rate across the entire U.S (7.5 per 1,000).

The greatest variation within a single HRR was seen in Napa, California, where the rate of PCI during 2008-10 ranged from about 4 per 1,000 beneficiaries in the Garberville HSA to more than 24 per 1,000 in the Clearlake HSA.



Percutaneous Coronary Intervention (PCI) per 1,000 Medicare Beneficiaries

by Hospital Service Area (2008-10)

11.3 to	18.9	(64)
9.3 to <	11.3	(63)
7.9 to <	9.3	(62)
6.5 to <	7.9	(63)
2.8 to <	6.5	(64)
Insufficient data		(10)

Map 6. Percutaneous coronary intervention (PCI) per 1,000 Medicare beneficiaries among hospital service areas in the Middle Atlantic region (2008-10)

PCI is performed frequently enough to support the reporting of rates at the hospital service area level. Among HSAs in the Middle Atlantic region during 2008-10, the rate of PCI was lowest in Rhinebeck, New York, where there were 2.8 procedures performed per 1,000 Medicare beneficiaries. The rate was more than six times higher in the Roaring Spring, Pennsylvania HSA, where 18.9 procedures per 1,000 occurred.

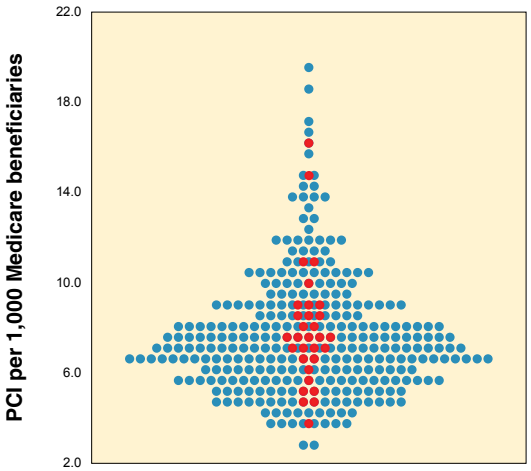


Figure 3. Percutaneous coronary intervention (PCI) per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each blue dot represents the rate of PCI in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Low Back Pain

Low back pain is a nearly universal complaint that afflicts most American adults at some point in their lives. Most episodes of back pain go away in time with no treatment, even when the pain is severe or when it persists for weeks or months. The majority of back pain is termed "non-specific," which means it cannot be traced to a specific cause. Back pain that has lasted up to four weeks is called "acute." Pain that lasts more than four weeks may be considered "sub-acute" or "chronic," depending upon the duration. While back pain is common, diagnosing its specific cause can be difficult. Less than 10% of people who visit their clinicians because of back pain have an identifiable cause. For the vast majority, the cause of their pain is unknown.

How low back pain is diagnosed and treated

After first ruling out a serious cause for acute back pain (for example, a spine infection or cancer), physicians and nurses will often recommend over-the-counter pain medications such as acetaminophen, ibuprofen, or naproxen. Spinal manipulation may also help. Bed rest and inactivity will delay recovery. If the pain is severe and interferes with sleep or the ability to work, physicians sometimes recommend short courses of drugs that relax muscles, such as cyclobenzaprine, or pain medications that contain morphine-like drugs known as opioids, such as codeine.

For non-specific back pain that lasts beyond the first month, there are a variety of other treatments, including physical therapy, exercise, massage, acupuncture, yoga, relaxation therapy, and cognitive behavioral therapy. There is little evidence that surgery is better than non-surgical treatment for chronic or persistent non-specific low back pain in patients who do not also have leg pain.

Sometimes a herniated or "ruptured" disc in the spine can cause sciatica, pain that usually extends down the back of the legs and may occur along with back pain. Herniated discs are visible on advanced imaging tests—such as a magnetic resonance image (MRI) or a computed tomography (CT) scan—but not on plain X-rays. These discs sit between the vertebrae to cushion the impact of bone on bone. They are filled with a soft, jelly-like material, which can bulge or break out from the fibrous covering of the disc, irritating nerves and causing sciatica. Herniated discs are not believed to cause low back pain, only sciatica. Herniated discs are most commonly diagnosed in people aged 30-50 years and affect men and women about equally.

If the pain persists for more than a month, the patient's physician may order an imaging test such as an MRI or CT scan. Imaging tests are usually not helpful in diagnosing and treating back pain and may even be misleading. Some people with severe back pain have normal spine imaging tests. On the other hand, more than half of people without back pain have a bulging

or herniated disc on imaging scans, so the results of an imaging test alone are not enough to determine a source of the pain or indicate a particular treatment.

Back pain and leg pain may be related to arthritis, which can cause bony growths on the vertebrae that press on nerves or irritate them. This condition is known as spinal stenosis ("stenosis" means "narrowing"). Pain from spinal stenosis can radiate down the legs and feel like numbness or tingling, and unpleasant muscle spasms are common. Spinal stenosis most often occurs among people in their 50s and older and appears to be more common in women than men.

The pain associated with herniated disc usually goes away on its own. Some people with mild to moderately symptomatic stenosis get better with no treatment, some get worse, and most stay about the same. Strengthening and aerobic activities may help reduce pain and improve the ability to do physical activities for some people with spinal stenosis. Medications may also help with short-term flare-ups, but the drugs can be habit forming and cause side effects. Steroid injections may relieve pain temporarily, although it is not known how often they can be taken safely.

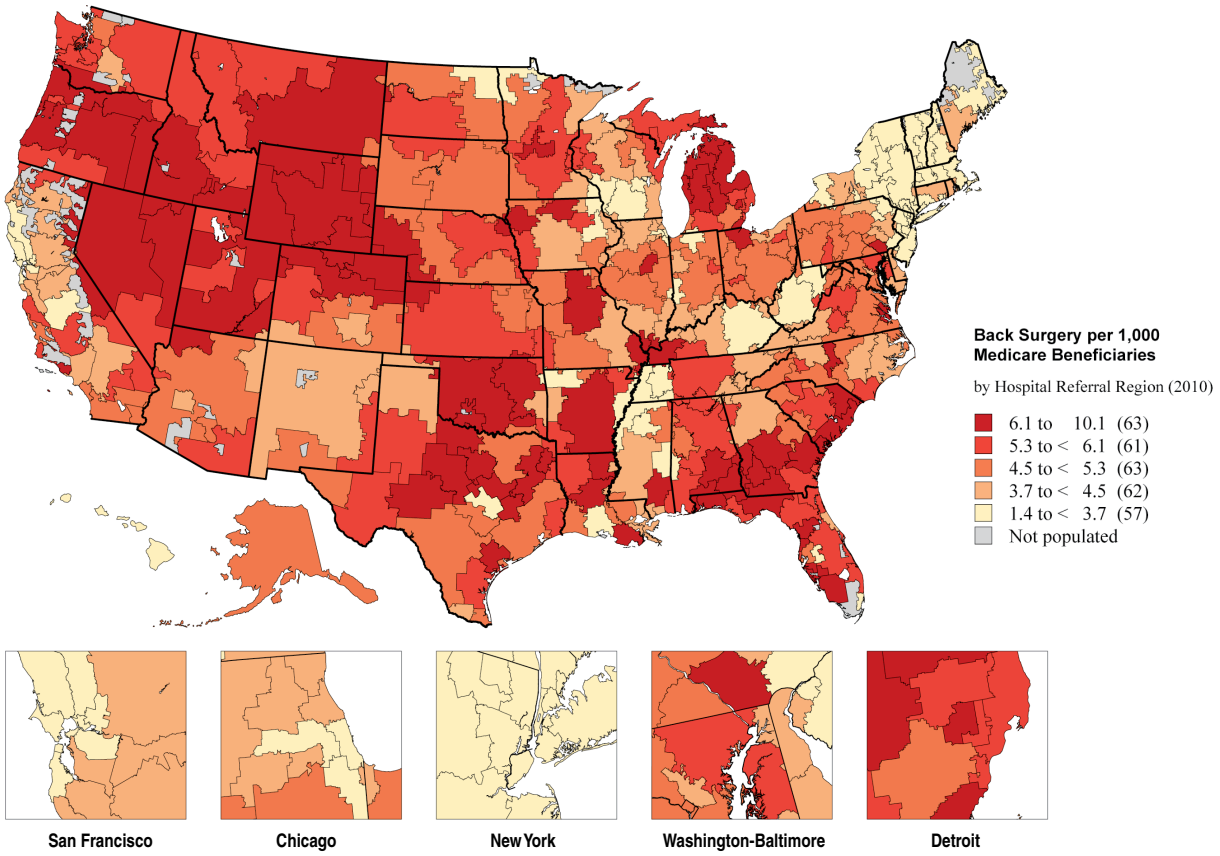
There are several surgical procedures used to treat herniated disc and spinal stenosis. Until recently, there has been limited scientific evidence to show when surgery might be effective. For herniated disc, surgery appears to be more helpful for leg pain than back pain. For those with leg pain, surgery may offer slightly faster relief than non-surgical treatment, but it is no more effective over time. Some patients get no relief at all or suffer more pain after surgery. [11,12,13]

Research now suggests that patients with spinal stenosis may find more pain relief from surgery than from non-surgical treatment.[14,15] However, surgery has more risks, and a significant number of people who undergo one type of surgery, spinal fusion, have additional back surgeries to treat ongoing pain.

Patient choices

Rates of back surgery varied nearly sevenfold in different parts of the country during 2010 (Map 7). Because patients differ in both their perceptions of pain and the disability it can cause and their preferences for treatment, they should not have surgery based solely on a diagnosis of chronic low back pain, spinal stenosis, or herniated disc. For some, the pain and lack of mobility are not severe enough to warrant major surgery, which involves real risks. Older patients may have other serious conditions, such as heart disease, that may also restrict their movements or increase the risks of surgery, so back surgery might not offer a substantial improvement in their quality of life. For some people with herniated disc or spinal stenosis, surgery may seem like the right choice despite the risks and uncertainty about the outcome.

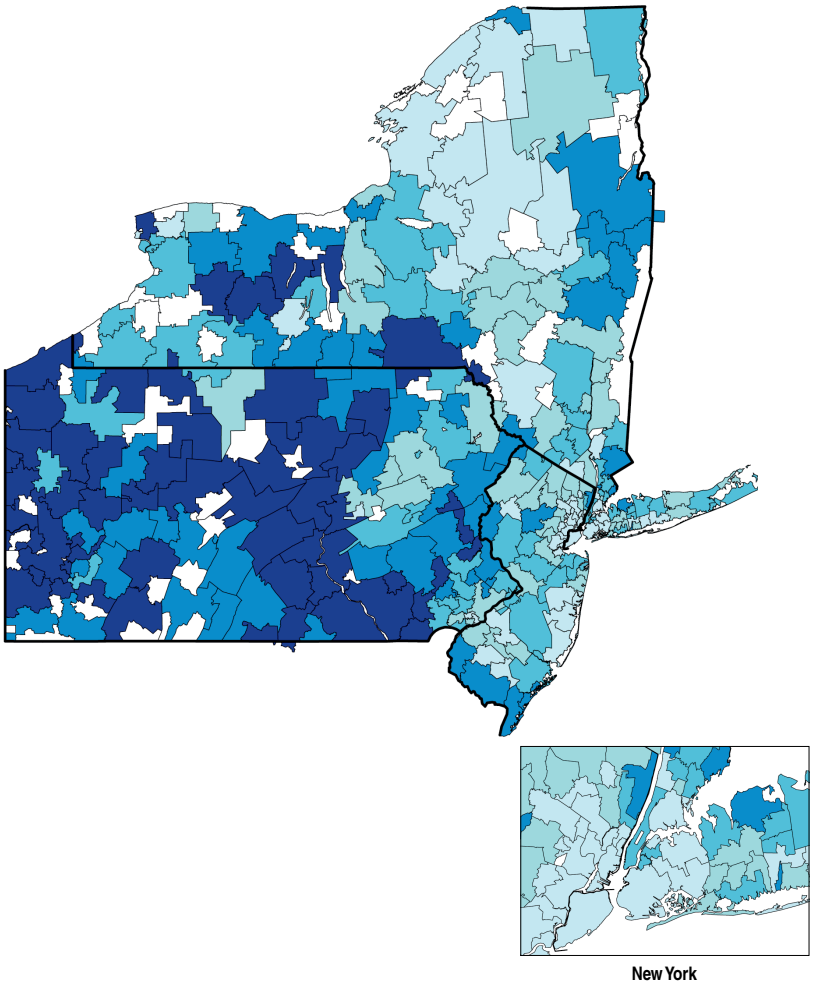
Low Back Pain



Map 7. Back surgery per 1,000 Medicare beneficiaries among hospital referral regions (2010)

The colors on the map represent the rates of back surgery per 1,000 Medicare beneficiaries in each HRR. Rates are adjusted for age, sex, and race. The highest rate, 10.1 surgeries per 1,000 Medicare beneficiaries, was seen in Casper, Wyoming. This rate was nearly seven times higher than the lowest rate, 1.5 surgeries per 1,000, seen in the Honolulu HRR. The average rate of back surgery in the U.S. was 4.7 per 1,000.

The greatest variation within a single HRR was seen in Albuquerque, where the rate of back surgery ranged from 1.2 per 1,000 beneficiaries in the Gallup/Crownpoint HSA to 9.5 per 1,000 in the Ruidoso HSA during 2008-10.



Map 8. Back surgery per 1,000 Medicare beneficiaries among hospital service areas in the Middle Atlantic region (2008-10)

Back surgery is performed frequently enough to support the reporting of rates at the hospital service area level. Among HSAs in the Middle Atlantic region, the back surgery rate varied more than eight-fold, from a low of 0.8 per 1,000 in the Jersey City HSA to a high of 7.1 per 1,000 in the Ephrata, Pennsylvania HSA.

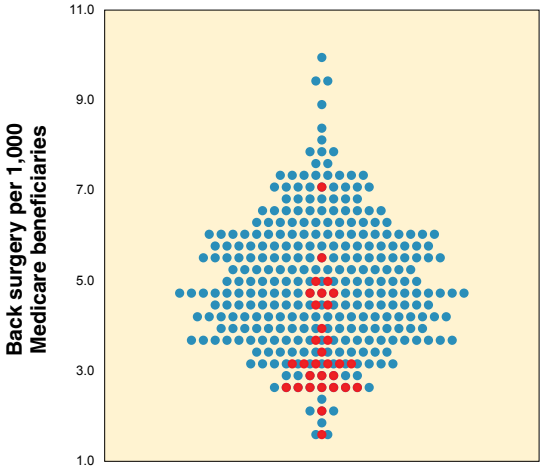


Figure 4. Back surgery per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each blue dot represents the rate of back surgery in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Osteoarthritis of the Knee and Hip Joints

As people age, their knee and hip joints may become stiff and sore due to osteoarthritis, or degeneration of the joint cartilage. Painful osteoarthritis can limit mobility, and pain medications and other non-surgical approaches may have limited power to relieve symptoms. For patients suffering from severe osteoarthritis pain, surgeons may recommend total joint replacement. This is a major surgical procedure that removes the patient's joint and replaces it with a prosthetic (artificial) device.

How osteoarthritis is diagnosed and treated

Osteoarthritis of the hip or knee is usually diagnosed on the basis of the patient's symptoms, followed by an imaging test such as an X-ray or a magnetic resonance image (MRI), which can show damage to the cartilage and bone in the joint. But the severity of the damage that appears on an image is not a sufficient reason for recommending treatment. Some patients, even those with severe symptoms and X-ray or MRI evidence of damage to the joint, are not bothered enough by their condition to want to undergo surgery. A recent Canadian study found that only about 35% of patients with severe symptoms of arthritis and significant damage to their joint definitely or probably wanted surgery at that time. Most were unwilling to have it, or unsure.[16] Moreover, patients with severe degeneration on an X-ray or MRI may experience little pain, while the joints of some patients with severe pain may show little degeneration on images.

There are several ways to treat knee and hip pain, each of which has potential benefits and risks. Exercise can help reduce stiffness, strengthen supporting muscles, and boost energy level and mood. Clinicians may recommend that patients with knee osteoarthritis lose weight, which can relieve stress on the knees and poses very little risk (and may offer other health benefits). It is not known whether weight loss helps hip pain.

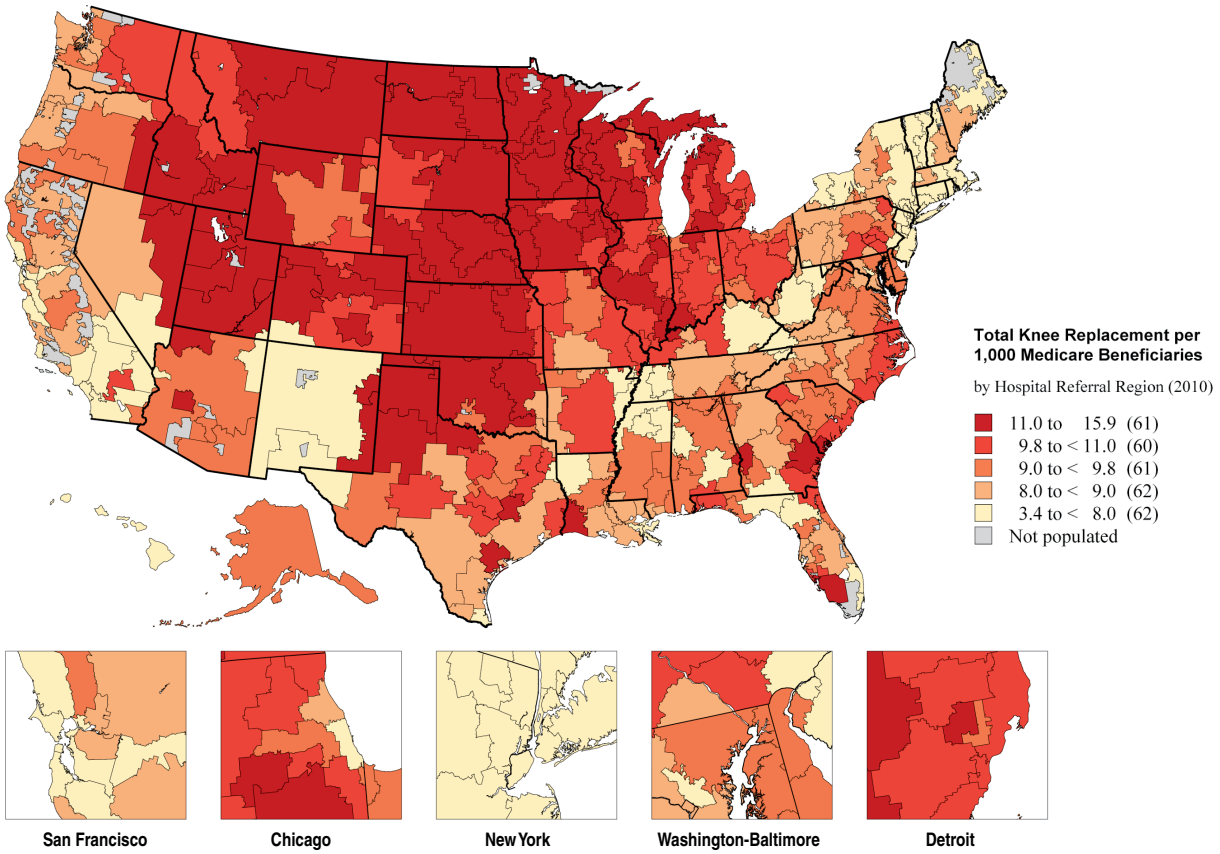
Pain medications such as aspirin, ibuprofen, naproxen, and acetaminophen may relieve pain, but many pain medications can irritate the stomach when taken for long periods of time or in high doses. In rare cases, this irritation can cause life-threatening bleeding. Using a cane or walker can improve mobility but will not relieve pain.

For patients with severe osteoarthritis, total joint replacement usually relieves pain and improves mobility. Like any major surgery, joint replacement can pose serious risks, including death, a blood clot in the lung, and infection. The initial rehabilitation period for total joint replacement may last weeks, during which time mobility is severely limited. It may take another two to three months before the patient can resume most of his or her usual daily activities. For about 10% of patients, surgery does not relieve pain and may make it worse. A few patients may experience problems due to the prosthetic joint itself. Eventually the artificial joint may wear out, and the patient may face the same decision about surgery when he or she is older and may be less able to undergo surgery safely.

Patient choices

Rates of surgery to replace a hip or knee varied more than fourfold across HRRs during 2010 (Maps 9 and 11), reflecting the lack of agreement about how best to treat patients with osteoarthritis. The decision about whether or not to undergo joint replacement surgery should be shared between the patient and his or her clinician. For some patients, the pain and activity limitations from osteoarthritis are not severe enough to warrant major surgery, and they would prefer to continue with non-surgical treatments or try losing weight. Some patients have other serious conditions, such as lung disease, that make surgery more dangerous. For others, the risks of surgery and the time needed for rehabilitation are worth taking.

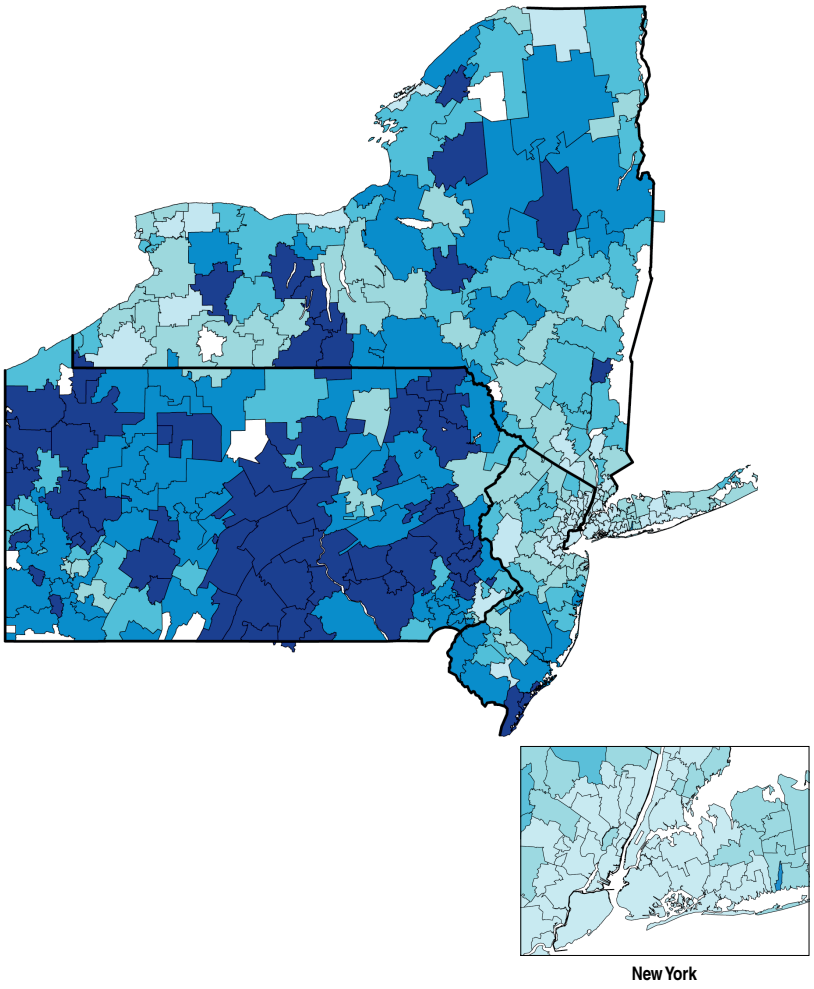
Osteoarthritis of the Knee and Hip Joints



Map 9. Total knee replacement per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each area on the map represents an HRR. The color indicates the rate of total knee replacement per 1,000 Medicare beneficiaries in that HRR. Rates are adjusted for age, sex, and race. There was considerable variation in the rates at which Medicare beneficiaries underwent knee replacement during 2010. Medicare beneficiaries living in the Idaho Falls, Idaho HRR were more than four times more likely to undergo joint replacement surgery for osteoarthritis of the knee than beneficiaries living in Honolulu (15.8 per 1,000 beneficiaries versus 3.4 per 1,000). The national average rate of knee replacement was 9.0 per 1,000.

The greatest variation within a single HRR was seen in Lexington, Kentucky, where the rate of knee replacement surgery during 2008-10 ranged from 3.3 per 1,000 beneficiaries in the Harlan HSA to 12.3 per 1,000 beneficiaries in the Versailles HSA during 2008-10.



Map 10. Total knee replacement per 1,000 Medicare beneficiaries among hospital service areas in the Middle Atlantic region (2008-10)

Knee replacement is performed frequently enough to support the reporting of rates at the hospital service area level. Among HSAs in the Middle Atlantic region, the rate of total knee replacement ranged from a low of 2.9 per 1,000 in the Perth Amboy, New Jersey HSA to a high of 13.0 per 1,000 in the Windber, Pennsylvania HSA.

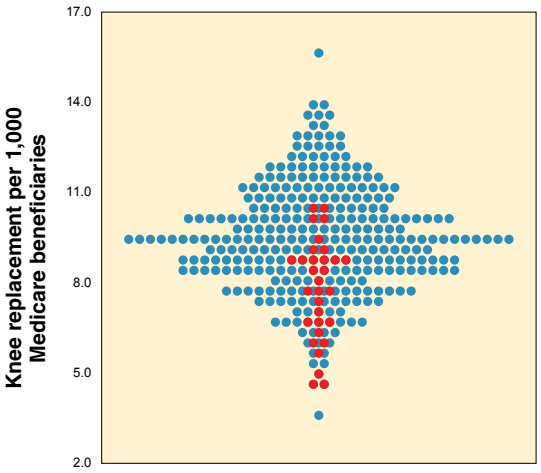
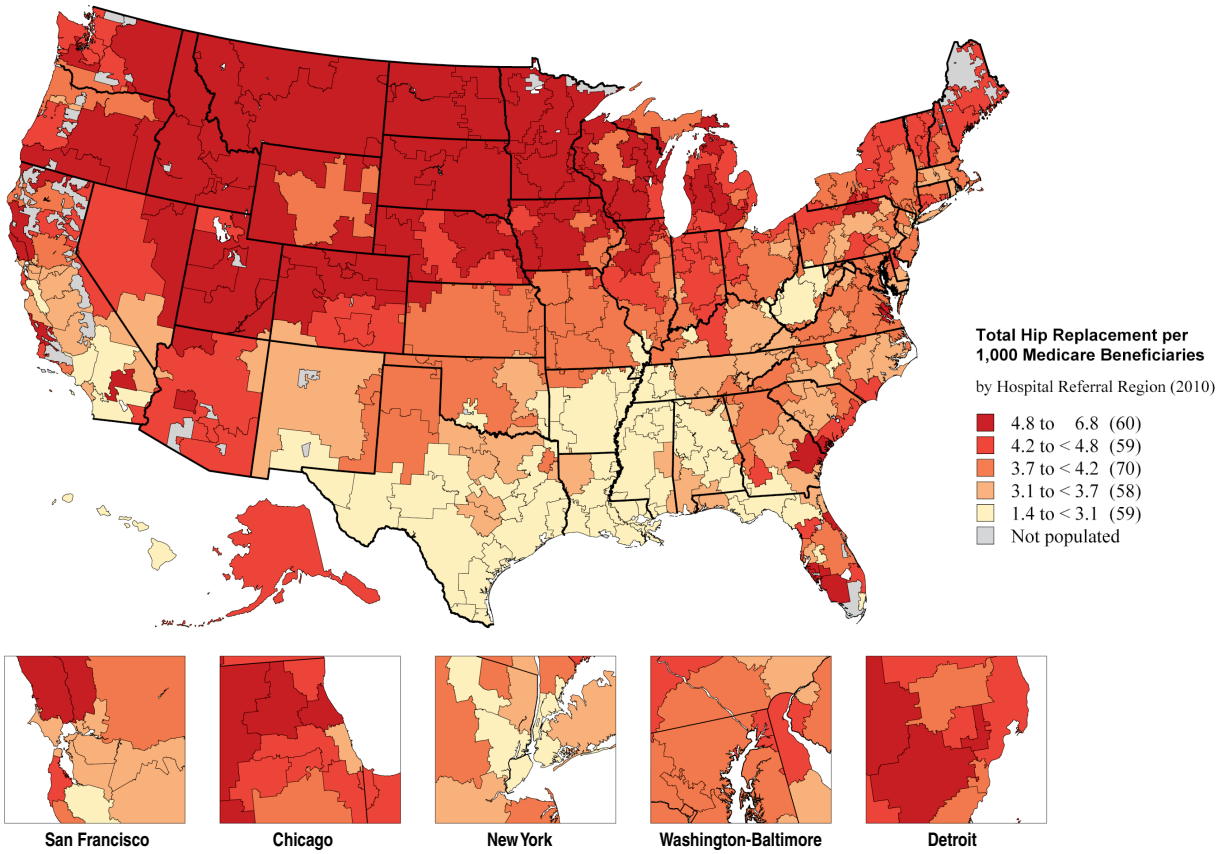


Figure 5. Total knee replacement per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each blue dot represents the rate of knee replacement in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

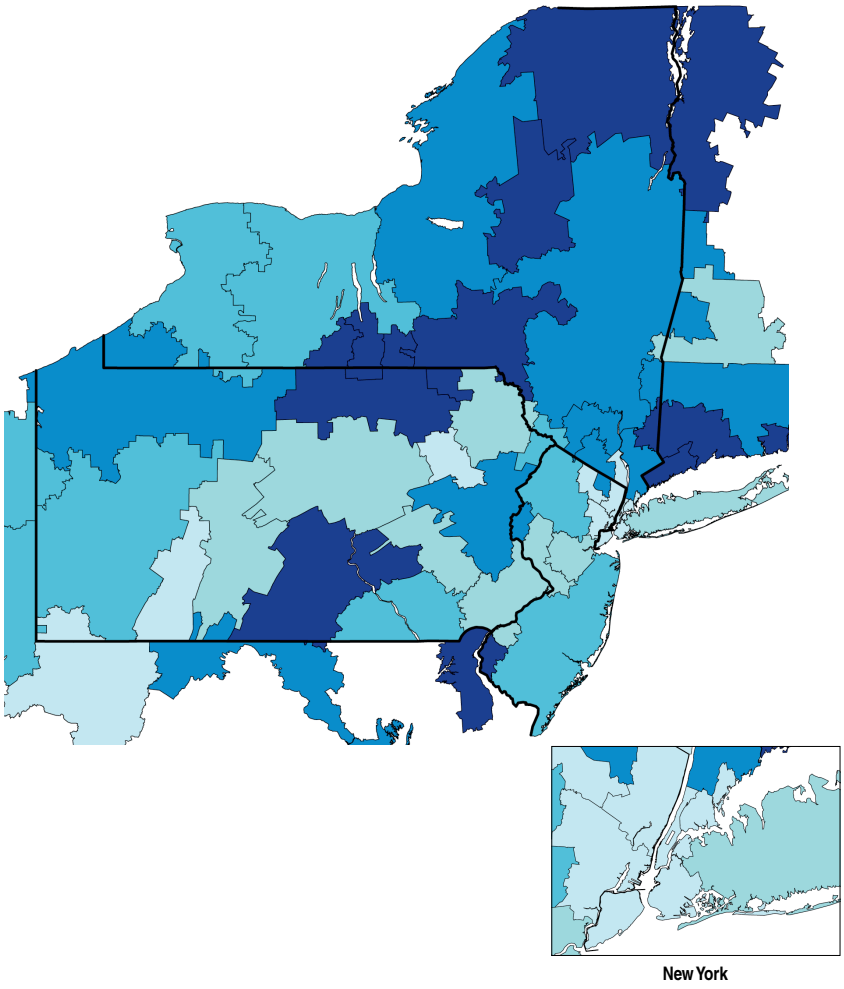
Osteoarthritis of the Knee and Hip Joints



Map 11. Total hip replacement per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each area on the map represents an HRR. The color indicates the rate of total hip replacement per 1,000 Medicare beneficiaries in that HRR. Rates are adjusted for age, sex, and race. There was considerable variation in the rate at which Medicare beneficiaries underwent hip replacement. The highest rate, 6.7 surgeries per 1,000 beneficiaries, was seen in the Minot, North Dakota HRR; the lowest rate, 1.4 procedures per 1,000, was seen in Honolulu. In other words, beneficiaries living in and around Minot were more than four times more likely to undergo the surgery than beneficiaries living in Honolulu. The average rate of hip replacement in the U.S. was 3.9 per 1,000 Medicare beneficiaries.

Even within a single HRR, there was substantial variation in rates of hip replacement. For example, in the San Antonio, Texas region during 2008-10, the rate of hip replacement surgery ranged from less than 1 procedure per 1,000 beneficiaries in and around the community of Laredo to more than 4 per 1,000 beneficiaries in Kerrville.



Total Hip Replacement per 1,000 Medicare Beneficiaries

by Hospital Referral Region (2010)

- 4.3 to 5.1 (8)
- 4.0 to < 4.3 (8)
- 3.7 to < 4.0 (8)
- 3.4 to < 3.7 (8)
- 2.3 to < 3.4 (8)

Map 12. Total hip replacement per 1,000 Medicare beneficiaries among hospital referral regions in the Middle Atlantic region (2010)

The rate of hip replacement varied by a factor of two in the Middle Atlantic region, from 2.4 in the Bronx, New York HRR to 5.1 in Sayre, Pennsylvania.

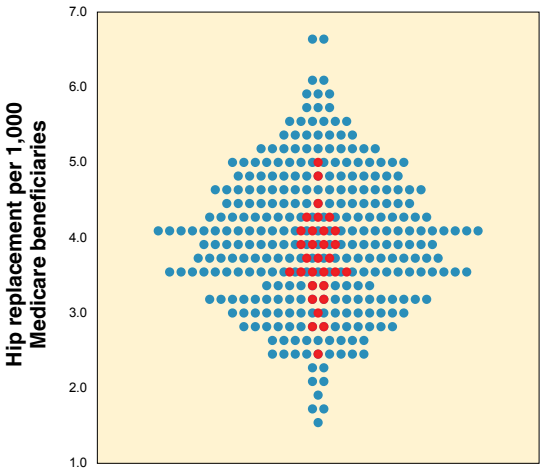


Figure 6. Total hip replacement per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each blue dot represents the rate of hip replacement in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Carotid Artery Disease

The carotid arteries supply blood to the brain. Fatty deposits called plaques sometimes form inside them. When they do, the condition is called carotid artery disease or carotid stenosis ("stenosis" means "narrowing"). Carotid artery disease often causes no symptoms. Many people learn they have the condition only after they have a test, such as an ultrasound, that shows how well blood is flowing in the arteries.

Having carotid artery disease means that a patient is at increased risk of having a stroke or a transient ischemic attack (TIA). A stroke happens when blood flow to a part of the brain is blocked by a blood clot or a piece of plaque that has broken off and traveled up into the smaller blood vessels in the brain. If a part of the brain goes without blood for too long, the cells in that area die. The effects may last for days, weeks, months, or the rest of the patient's life. A TIA is a temporary stroke. A clot or plaque blocks the flow of blood for a short time and then dissolves, and the symptoms go away in a matter of minutes or hours.

Even though carotid artery disease can increase a person's risk of stroke, most people with the condition never have one. Out of 100 people with carotid artery disease who take medication to lower their risk and have not had a stroke or TIA in the past 12 months, a little more than 2 will have a stroke within the next year, and 98 will not. [17]

How carotid artery disease is diagnosed and treated

Carotid artery disease is diagnosed with various imaging tests including ultrasound, which gives a picture of the insides of the arteries in the neck and can show whether and by how much they are narrowed by plaque. Studies show that medications that lower blood pressure and help prevent blood clots can lower the risk of stroke. Quitting smoking and getting regular physical activity can also lower the risk of stroke, as can carotid artery surgery. The two main surgeries are carotid endarterectomy and carotid stenting. During an endarterectomy, the surgeon makes an incision in the neck, opens the artery, removes the plaque, and closes the artery back up. Carotid stenting is a relatively new procedure. The surgeon inserts a stent (a tiny metal tube) to keep the artery open. Both procedures involve a stay in the hospital.

In asymptomatic patients—those who have not had a stroke or TIA within the past 12 months—carotid endarterectomy surgery can reduce the risk of stroke more than medications alone (to about 6% over five years versus about 12% over five years for medication alone). But surgery itself can cause a stroke, a heart attack, or death. Even though surgery can lower the chance of stroke, there is no strong evidence that people who have it live longer than people who do not.[17]

Patient choices

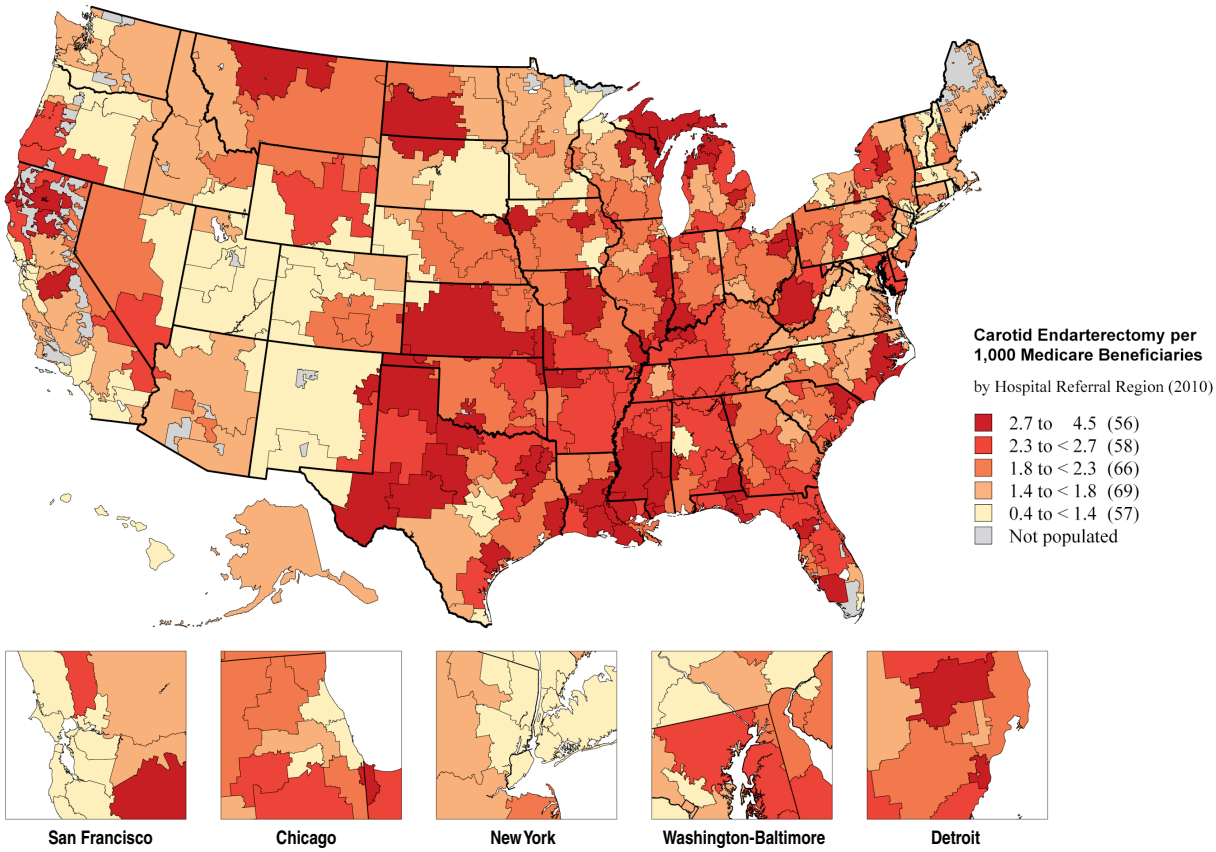
Once the diagnosis of carotid stenosis is made, the patient has the option to be treated medically—with drugs and lifestyle changes—or with medical treatment plus surgery. Medical treatment alone can help, and surgery reduces the risk fur-

ther. But there is a trade-off, because surgery also increases the short-term risk of stroke, heart attack, and death. In addition, only 15% of all strokes are due to carotid artery disease. Other health conditions, such as heart, lung or kidney disease, and diabetes, can also cause a stroke, and surgery does not reduce the risk of stroke from these causes.

Physicians differ in the value they place on the short-term risks of surgery versus the long-term risks of stroke. There is also disagreement among physicians about the value of carotid endarterectomy versus carotid stenting. The very high variation in rates of carotid endarterectomy in different parts of the country (Map 13) is likely due in part to the range of opinions about the value of surgery among clinicians.

The decision to proceed or not with carotid artery surgery should be shared between the patient and clinician. For some patients, the potential long-term benefits of carotid artery surgery will outweigh the possible short-term risks. For others, the immediate risks of surgery will outweigh the long-term benefits, and they would prefer to continue with medical treatment.

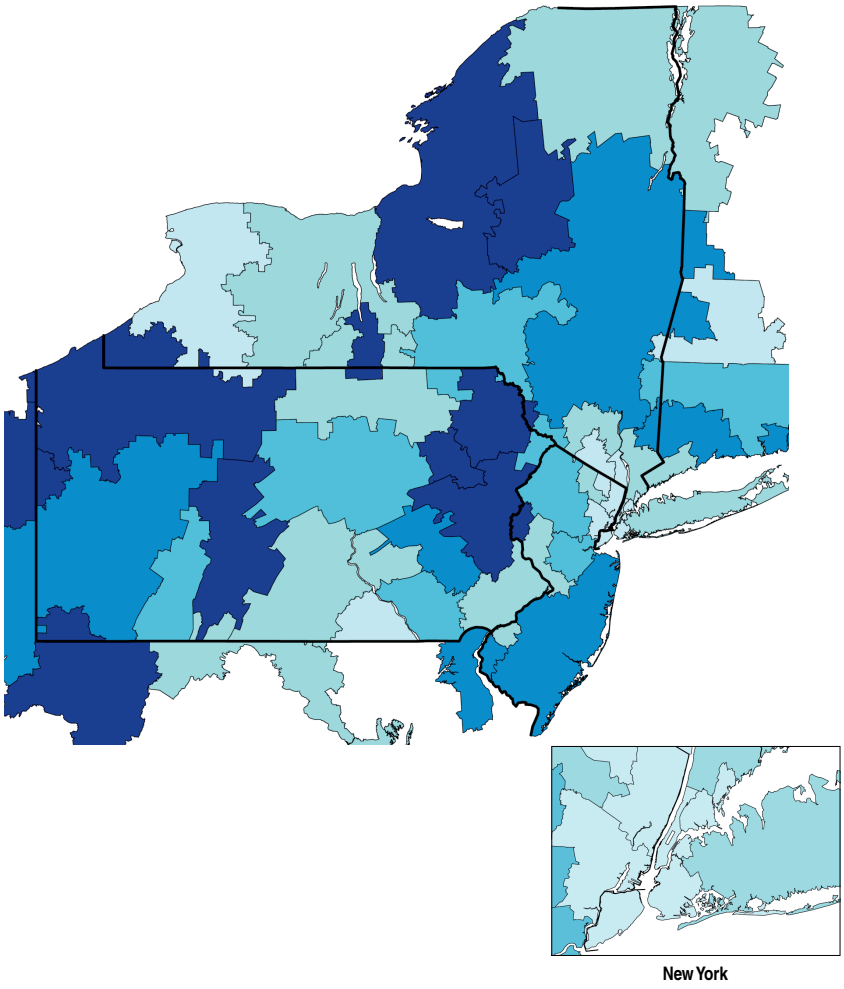
Carotid Artery Disease



Map 13. Carotid endarterectomy per 1,000 Medicare beneficiaries among hospital referral regions (2010)

The colors on the map represent the rates of carotid endarterectomy per 1,000 Medicare beneficiaries in each HRR. Rates are adjusted for age, sex, and race. The highest rate, 4.4 surgeries per 1,000 beneficiaries, was seen in the Lafayette, Louisiana HRR. The lowest rate, 0.4 surgeries per 1,000, was seen in Honolulu; Medicare beneficiaries living in Lafayette were ten times more likely to undergo the procedure than beneficiaries living in Honolulu. The average rate of carotid endarterectomy surgery was 1.9 per 1,000 in the entire U.S.

The greatest variation within a single HRR was seen in East Long Island, New York, where the rate of surgery during 2008-10 ranged from 0.5 per 1,000 beneficiaries in the Far Rockaway area to 2.7 per 1,000 beneficiaries in Greenport.



Carotid Endarterectomy per 1,000 Medicare Beneficiaries

by Hospital Referral Region (2010)

- 2.1 to 3.3 (9)
- 1.8 to < 2.1 (6)
- 1.5 to < 1.8 (7)
- 1.3 to < 1.5 (10)
- 0.8 to < 1.3 (8)

Map 14. Carotid endarterectomy per 1,000 Medicare beneficiaries among hospital referral regions in the Middle Atlantic region (2010)

The rate of carotid endarterectomy varied more than threefold in the Middle Atlantic region, from 0.9 in the Manhattan HRR to 3.3 in Elmira, New York.

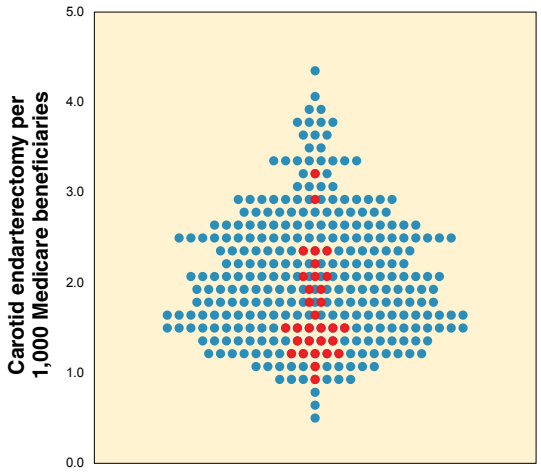


Figure 7. Carotid endarterectomy per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each blue dot represents the rate of carotid endarterectomy in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Gallstones

Gallstone disease is one of the most common and costly of all digestive disorders. Gallstones are hard, pebble-like deposits that can form in the gallbladder, a pear-shaped sac located in the upper abdomen that secretes bile into the small intestine to aid the digestion of fats. Gallstones can be as small as a grain of sand or as big as a golf ball. They form for unknown reasons, and they are most common among women, certain ethnic groups, people over 40, and those who are overweight, pregnant, have diabetes, take certain medications (for example, birth control pills), or lose a lot of weight quickly.

How gallstones are diagnosed and treated

In the past, gallstones were generally diagnosed when a patient suffered a gallbladder "attack," an episode of moderate to severe abdominal pain caused by one of two conditions: biliary colic or acute cholecystitis. Biliary colic, which occurs when the stone or stones irritate the lining of the gut, generally goes away on its own in a matter of minutes to hours. In acute cholecystitis, the stone blocks a bile duct, causing the gallbladder to become inflamed and sometimes infected. Complications of gallstones can include jaundice (yellowing of the skin and whites of the eyes), fever, and acute pancreatitis (inflammation of the pancreas).

These days, most gallstones are detected as "silent gallstones," meaning they do not cause symptoms. The diagnosis is usually made when the patient is undergoing an imaging test for another condition. Gallstones are diagnosed using ultrasound, X-ray, computed tomography (CT) scan, or another method of imaging. Many people have gallstones and never have symptoms.

Patients with gallstones and no symptoms ("silent gallstones") do not require treatment; rather, they should be educated about the symptoms of gallstone disease and when to seek treatment if symptoms occur. Patients who suffer from gallstones that cause symptoms (biliary colic or acute cholecystitis) may want to consider the various treatment options: medications, minimally invasive procedures, and surgery. Some kinds of gallstones, which are made of cholesterol, can be treated with drugs that dissolve cholesterol. Gallstones are sometimes broken up using shock wave lithotripsy, a powerful beam of sound. Alternatively, the gallbladder can be surgically removed (cholecystectomy) to prevent future attacks. In rare cases, a stone blocks the bile duct completely, and surgery must be performed immediately to prevent injury to the pancreas.

The gallbladder is commonly removed with minimally invasive (laparoscopic) surgery. Compared with open surgery, laparoscopic surgery often involves less post-operative pain, a faster recovery, and less risk, unless the patient has coronary artery disease, chronic obstructive pulmonary disease, or previous upper abdominal surgeries.

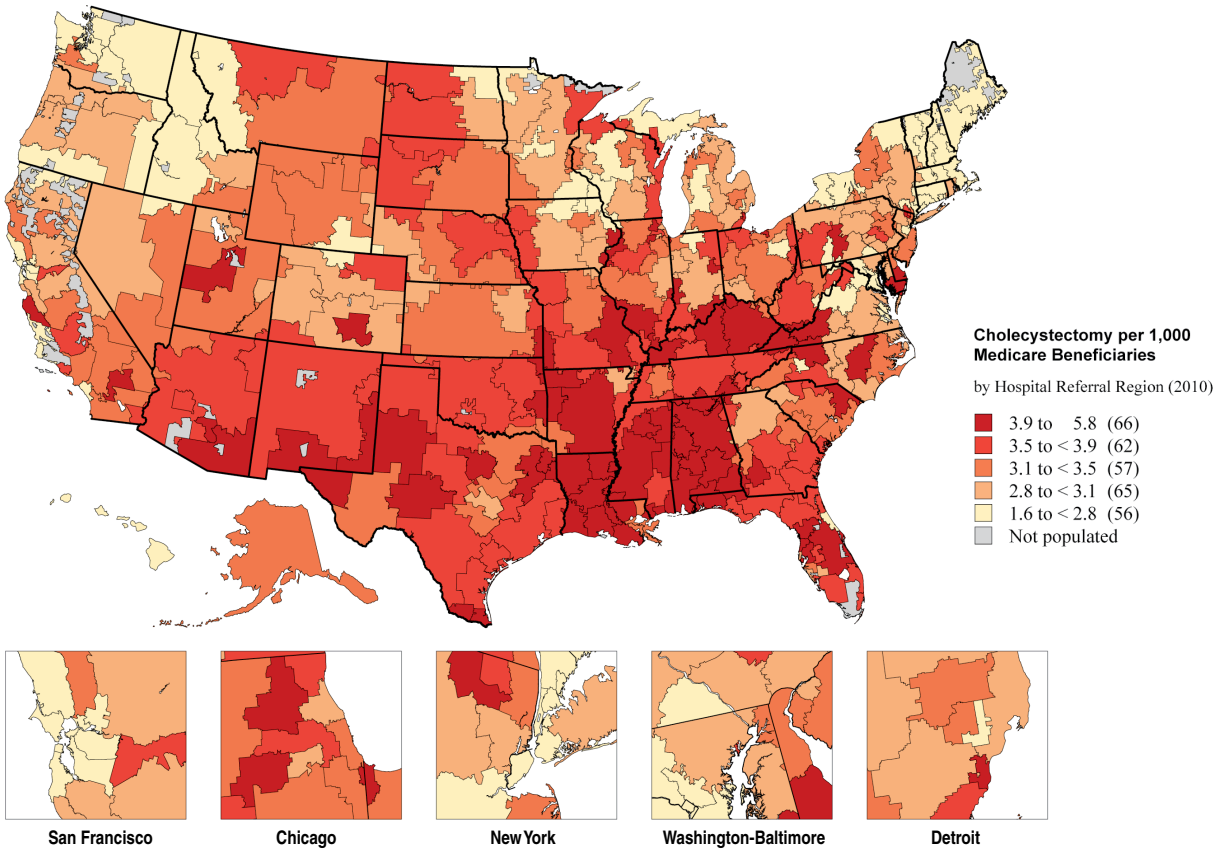
Patient choices

Many people who have been diagnosed with silent gallstones will never suffer any symptoms, and choosing no treatment at all is an option. People who have suffered an episode of biliary colic or acute cholecystitis may choose watchful waiting, which simply means waiting until another attack and then deciding if they wish to be treated; or they can consider being treated immediately.

The rate of gallbladder surgery varies widely in different parts of the U.S. (Map 15). Much of this variation appears to be due to differences of opinion among clinicians. Some surgeons recommend that any patient who has gallstones, or has suffered a single gallbladder attack, have his or her gallbladder removed as a precaution against a future attack requiring emergency surgery. Many believe that it is better to remove the gallbladder when the patient is younger and less likely to suffer complications. Other physicians think it is better to wait, because most patients will not suffer an attack in the future, especially those who have silent gallstones.

The person in the best position to choose among these options is the patient. Some with silent gallstones may decide that the risk of a first attack is low enough that they would prefer not to undergo surgery. Even patients who have experienced an episode of biliary colic or acute cholecystitis may want to try drugs, dietary changes, or shock wave lithotripsy before they consider surgery; or they may be suffering from other conditions that are more worrisome than a possible gallbladder attack. Others may choose to undergo surgery to forestall any possibility of biliary colic or acute cholecystitis.

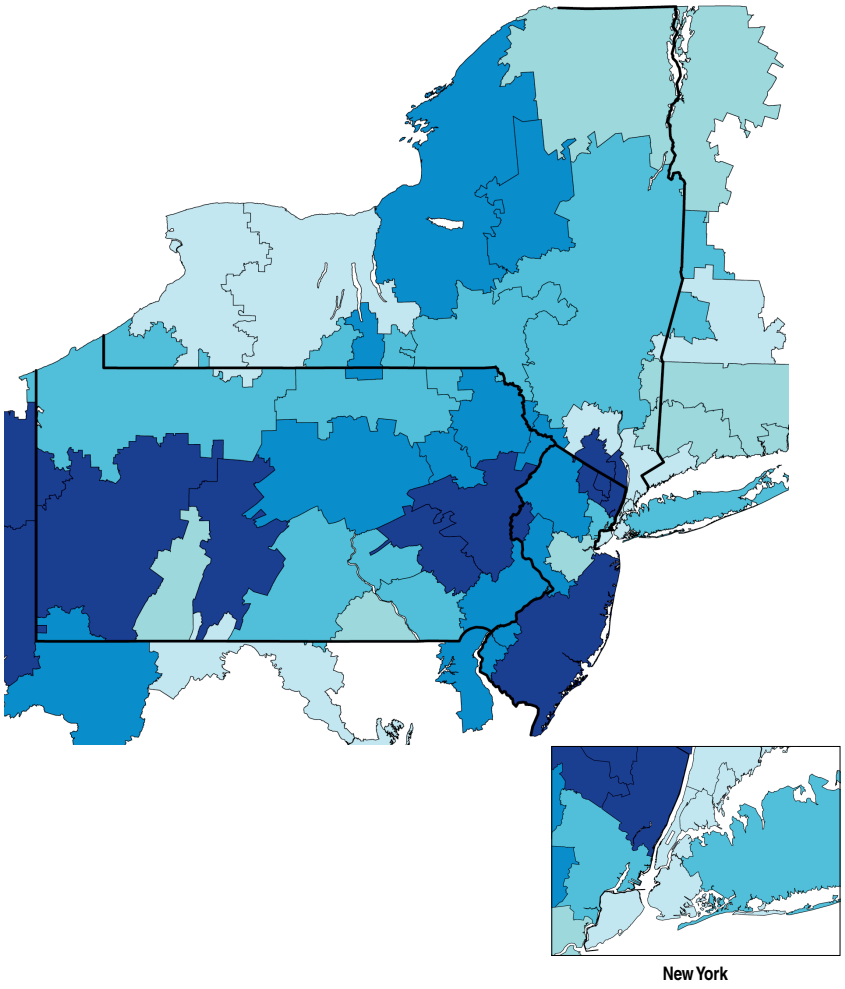
Gallstones



Map 15. Cholecystectomy per 1,000 Medicare beneficiaries among hospital referral regions (2010)

The colors on the map represent the rates of cholecystectomy per 1,000 Medicare beneficiaries in each HRR. Rates are adjusted for age, sex, and race. The highest rate, 5.8 procedures per 1,000 Medicare beneficiaries, was seen in the Lafayette, Louisiana HRR. The lowest rate, 1.7 procedures per 1,000, was seen in the Rochester, New York HRR. Medicare beneficiaries living in and around Lafayette were more than three times more likely to undergo gallbladder surgery than beneficiaries living in Rochester during 2010. The average rate of gallbladder surgery in the U.S. was 3.3 per 1,000.

The greatest variation within a single HRR during 2008-10 was seen in Tupelo, Mississippi, where the rate of gallbladder surgery ranged from 1.2 per 1,000 beneficiaries in the Starkville HSA to 8.1 per 1,000 in the Amory HSA.



Cholecystectomy per 1,000 Medicare Beneficiaries

by Hospital Referral Region (2010)

- 3.3 to 4.1 (9)
- 3.0 to < 3.3 (9)
- 2.8 to < 3.0 (8)
- 2.5 to < 2.8 (6)
- 1.6 to < 2.5 (8)

Map 16. Cholecystectomy per 1,000 Medicare beneficiaries among hospital referral regions in the Middle Atlantic region (2010)

Among the HRRs in the Middle Atlantic region, the rate of cholecystectomy ranged from 1.7 in the Rochester, New York HRR to 4.1 in Paterson, New Jersey, a more than twofold variation.

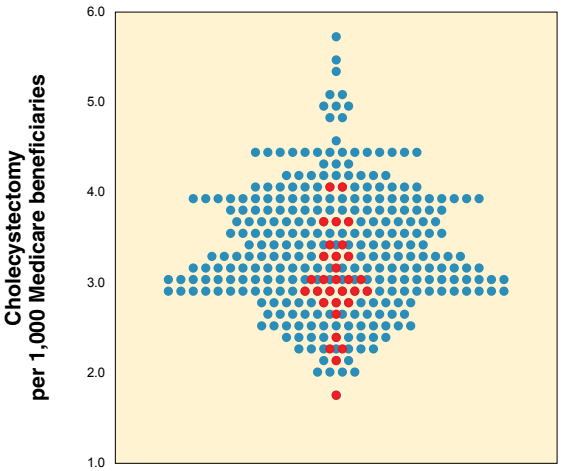


Figure 8. Cholecystectomy per 1,000 Medicare beneficiaries among hospital referral regions (2010)

Each blue dot represents the rate of cholecystectomy in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Enlarged Prostate (Benign Prostatic Hyperplasia)

The prostate is a gland that sits below a man's bladder and makes some of the fluid (semen) that carries sperm. The prostate surrounds the urethra, the tube that carries urine and semen down the penis and out of the body. As men age, the prostate often enlarges, pressing on the urethra and making it more difficult to urinate. This condition, called benign prostatic hyperplasia (BPH), is not cancer. Symptoms of BPH are very common in older men.

How benign prostatic hyperplasia is diagnosed and treated

BPH can cause a variety of symptoms. Men may feel the urge to urinate but find it takes several seconds for the flow to begin. The flow may be slow, it may start and stop, and men may feel the need urinate more often during the day and at night, and with greater urgency. Many men have an enlarged prostate for years with no symptoms, while others may develop severe symptoms over time. Others may have similar urinary symptoms but no enlarged prostate.

Clinicians diagnose BPH by first asking a man about his symptoms. This is usually followed by digital rectal exam, which involves the clinician inserting a gloved finger into the rectum and feeling the prostate gland through the rectum wall. The clinician may perform other tests such as a urinalysis or measuring the flow of urine.

An enlarged prostate can lead to other complications such as deteriorating bladder muscles, bladder stones, bladder infection, and blood in the urine. In some cases, a man may become unable to urinate at all, a complication known as acute urinary retention. To treat this condition, a catheter will be inserted into the bladder to allow urine to drain. Very rarely, an enlarged prostate may lead to kidney failure or serious infection.

For men with symptoms, there are a variety of treatment options available, including watchful waiting, drug treatments, minimally invasive therapies, and surgery. All have benefits and risks. In general, the treatments that provide the most symptom relief also have the highest risks.

Watchful waiting means that both the clinician and patient monitor symptoms. If symptoms worsen, or if they become too bothersome, the man can decide on a different course of treatment. The risks of watchful waiting include acute urinary retention and the chance that treatment done sometime in the future may provide less symptom relief than it might have had it been done sooner. Drugs such as alpha blockers, reductase inhibitors, or a combination of the two can prevent symptoms of BPH from worsening and provide adequate symptom relief for some men. Side effects caused by these medications go away when they are stopped. Minimally invasive therapies, such as radio waves and laser treatment, destroy prostate tissue around the urethra. They provide more symptom relief than medication but less than surgery. There are also more risks associated with these therapies than with medication but less than the risks associated with surgery.

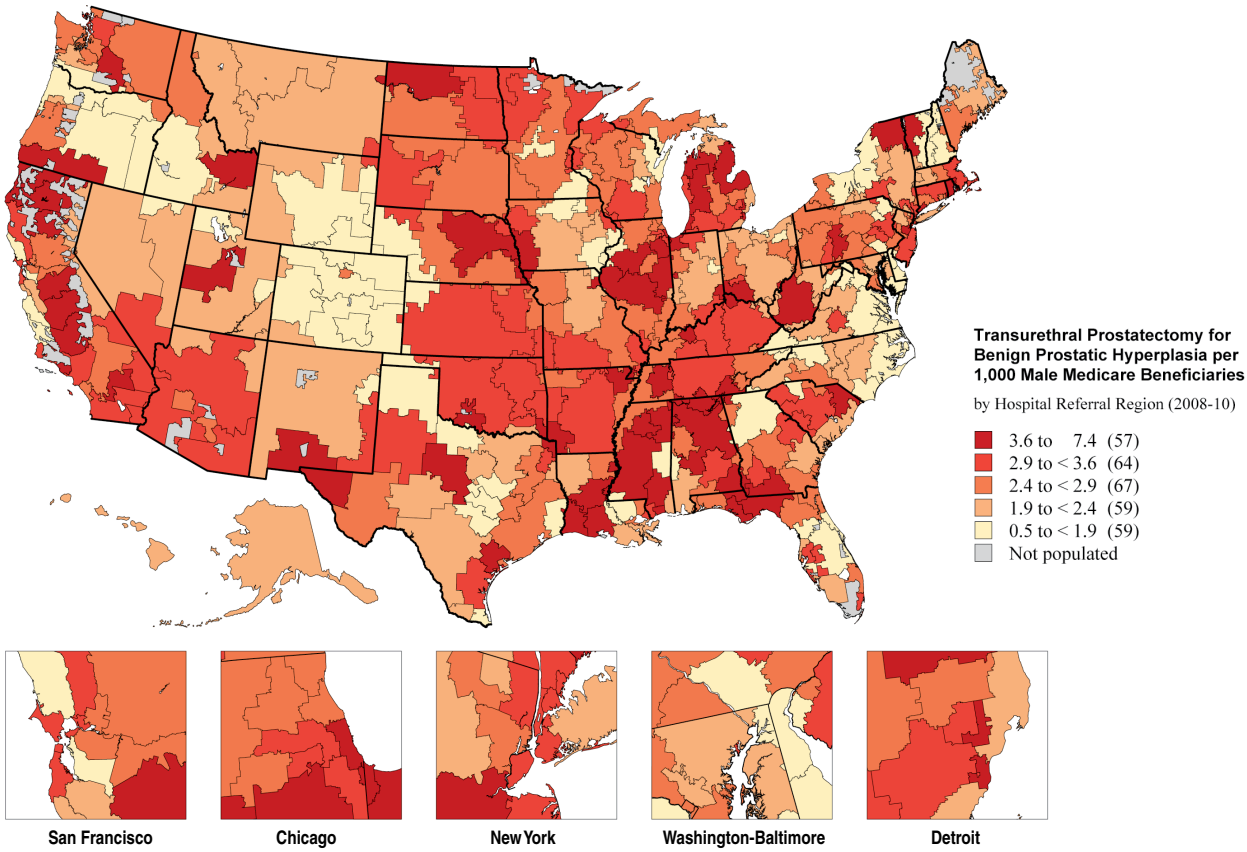
Of all the treatment options, surgery offers the best chance for improved symptoms, along with the highest risk of complications and side effects. The most common type of surgery is called a transurethral resection of the prostate (TURP). The most common complication of TURP surgery is retrograde ejaculation or "dry orgasm." This happens when the bladder fails to close when a man ejaculates and semen goes back into the bladder instead of out the penis. This permanent side effect occurs in more than 50% of men who have TURP surgery.

Patient choices

Clinicians have different opinions about the best way to treat BPH. Some may recommend surgery in order to prevent acute urinary retention, which is rarely dangerous but is quite uncomfortable and requires immediate treatment. Other clinicians suggest non-surgical remedies unless the man's symptoms have become extremely severe. These differences of opinion likely contribute to the twelvefold variation in rates of TURP, the most common surgery for BPH (Map 17).

However, because men with BPH differ in their perceptions of how bothersome their symptoms are and their preferences for treatment, clinicians cannot judge when or even if a patient should have surgery based on a diagnosis of BPH alone. Which treatment a man chooses, if any, should depend upon how bothersome his symptoms are to him, his level of concern about the possibility of his condition worsening, and his concern about the risks and side effects of surgery. For some men, BPH symptoms are not severe or sufficiently troubling to them to warrant surgery. These men would prefer to continue with less invasive treatments such as watchful waiting or drugs. For men who find their symptoms especially bothersome, the risks of surgery may seem worth taking, particularly if they have already tried other treatments that have failed.

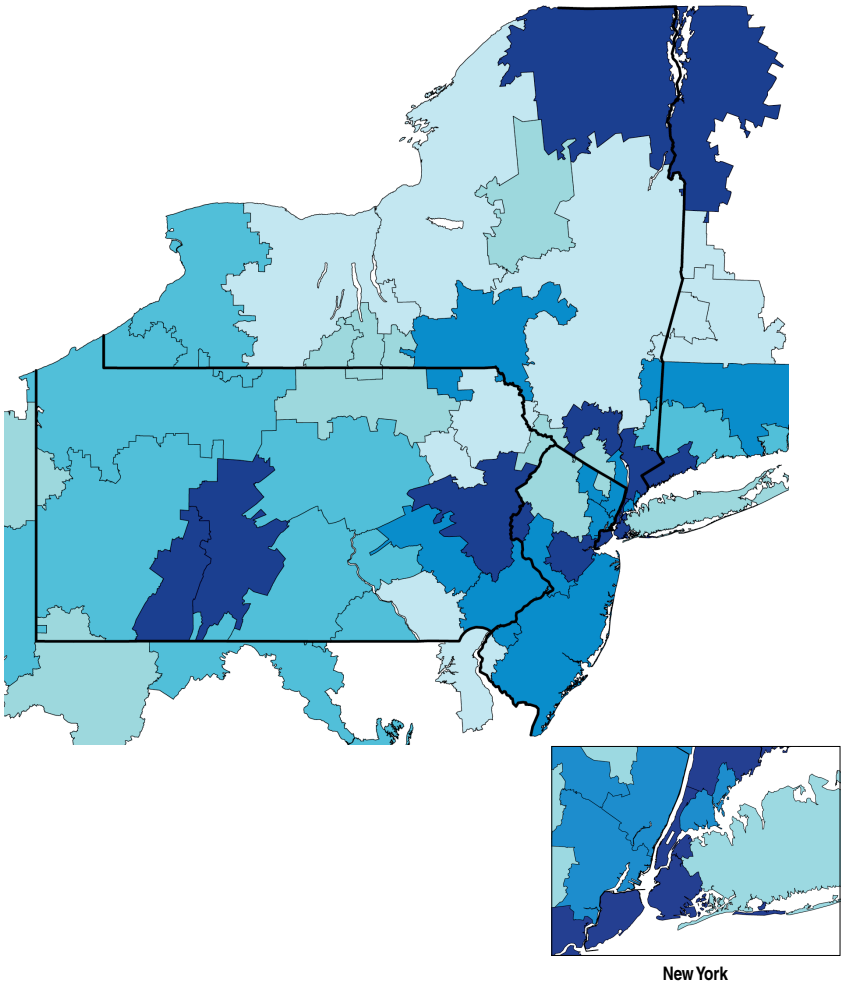
Enlarged Prostate



Map 17. Transurethral resection of the prostate (TURP) for benign prostatic hyperplasia (BPH) per 1,000 male Medicare beneficiaries among hospital referral regions (2008-10)

The colors on the map represent the rates of TURP for BPH per 1,000 male Medicare beneficiaries in each HRR. Rates are adjusted for age and race. Rates of TURP varied widely across the U.S. during 2008-10. The highest rate, 7.4 procedures per 1,000 male Medicare beneficiaries, was seen in the Idaho Falls, Idaho HRR. This rate was more than twelve times higher than the lowest rate, 0.6 surgeries per 1,000, in the Bend, Oregon HRR. The national average rate of TURP was 2.7 per 1,000.

The greatest variation within a single hospital referral region was seen in Seattle, where the rate of surgery ranged from 0.6 per 1,000 male beneficiaries in the Bellevue HSA to 9.8 per 1,000 male beneficiaries—more than sixteen times higher—in the Port Townsend HSA.



Transurethral Prostatectomy for Benign Prostatic Hyperplasia per 1,000 Male Medicare Beneficiaries

by Hospital Referral Region (2008-10)

- 3.2 to 5.1 (8)
- 2.7 to < 3.2 (9)
- 2.4 to < 2.7 (8)
- 2.1 to < 2.4 (7)
- 1.1 to < 2.1 (8)

Map 18. Transurethral resection of the prostate (TURP) for benign prostatic hyperplasia (BPH) per 1,000 male Medicare beneficiaries among hospital referral regions in the Middle Atlantic region (2008-10)

Among the HRRs in the Middle Atlantic region, the rate of TURP for BPH ranged from 1.1 in the Wilkes-Barre, Pennsylvania HRR to 5.1 in Altoona, Pennsylvania, a more than fourfold variation.

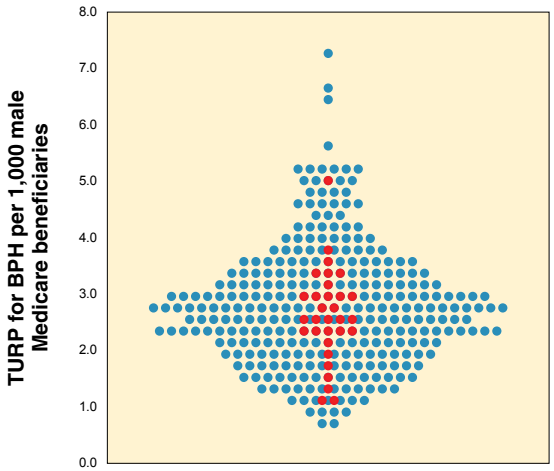


Figure 9. Transurethral resection of the prostate (TURP) for benign prostatic hyperplasia (BPH) per 1,000 male Medicare beneficiaries among hospital referral regions (2008-10)

Each blue dot represents the rate of TURP for BPH in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Early-Stage Prostate Cancer: Screening and Treatment

Prostate cancer is an age-related condition that occurs more commonly as men get older. Most prostate cancer is slow growing and often never causes problems or becomes life threatening. However, if prostate cancer does spread outside the prostate, it can cause bone pain and death. One complication in knowing how best to deal with prostate cancer is that there are no perfect tools for distinguishing which early-stage prostate cancers will become problematic from those that will not. Not all men wish to be screened for prostate cancer (screening means testing for the presence of cancer before it causes symptoms), and it is important for men to understand the trade-offs involved in the decision.

Screening for cancer with the prostate-specific antigen (PSA) test

The PSA test is a blood test that detects the prostate-specific antigen, a protein made by the prostate. A high level of PSA in the blood can indicate the presence of a cancer. However prostate cancer is not the only thing that can cause the level of PSA to be high. This means that sometimes the test leads to a false positive, a high reading when there is no cancer in the prostate. In other cases, the PSA test can miss a cancer. This is called a false negative.

A second important problem with relying on PSA level for cancer diagnosis is that the majority of early-stage prostate cancers are slow growing and unlikely to ever become life threatening. Diagnosing these cancers means that the test has uncovered the presence of something that does not require treatment. The problem is our current inability to distinguish between those early-stage prostate cancers that will grow slowly and those that will develop into aggressive disease.

How prostate cancer is diagnosed and treated

If the level of PSA is elevated, a biopsy is needed to determine whether cancer is present. A prostate biopsy can be painful, and there is a small risk of infection and bleeding. If cancerous cells are present in the biopsy, the clinician and the patient need to decide whether to engage in immediate active treatment and, if so, what type of treatment. There is often considerable uncertainty as to whether the cancer cells will ever grow enough to harm the patient.

There are three categories of treatment for early-stage prostate cancer: active surveillance, surgery, and radiation. Active surveillance, also known as “expectant management,” involves regularly monitoring the cancer and deciding on treatment only if it shows signs of progressing. Surgery to treat prostate cancer, known as a prostatectomy, removes the entire prostate gland. Radiation therapy is intended to kill the prostate cancer cells. For men who choose radiation therapy to treat their prostate cancer, several types are available.

Each treatment choice has both benefits and drawbacks. The benefit of choosing active surveillance is avoiding the side effects of surgery and radiation. But men

who choose active surveillance risk having their cancers grow to the point that they begin to cause symptoms, including pain, or become life threatening. Surgery may reduce a man's chances of dying from prostate cancer. But for many men, especially those with other health issues, the prostate cancer will never cause harm, even if left untreated. In addition, if the cancer has spread beyond the prostate, removing it surgically may not offer a cure.

Like any major surgery, removing the prostate gland poses risks. The most serious of these include death, heart attack, stroke, pneumonia, and a blood clot in the lungs. Far more common side effects are urine leakage (incontinence) and sexual problems (erectile dysfunction). About a third of men who undergo prostate surgery suffer incontinence and half suffer from erectile dysfunction. Radiation has many of the same common side effects as surgery and, in addition, can cause damage to the bowel and rectum. It is not known to what extent, if any, radiation treatment reduces the risk of dying of early-stage prostate cancer.

Patient choices

The first choice men face is whether or not to have a PSA test. Many clinicians begin recommending the test when a man reaches the age of 50. For men at increased risk of prostate cancer, including those with a family history of prostate cancer and African-American men, some guidelines recommend prostate cancer screening at the age of 40. Recent studies have found that getting a PSA test might offer a small reduction in the risk of death from prostate cancer in men who start screening between the ages of 55 and 69.[18] For older men, however, especially those over age 75, catching prostate cancer early and treating it probably will not reduce the risk of dying from prostate cancer. The uncertainty about whether and whom to screen is reflected in the fifteen-fold variation in rates of PSA testing among men age 68-74 (Map 19).

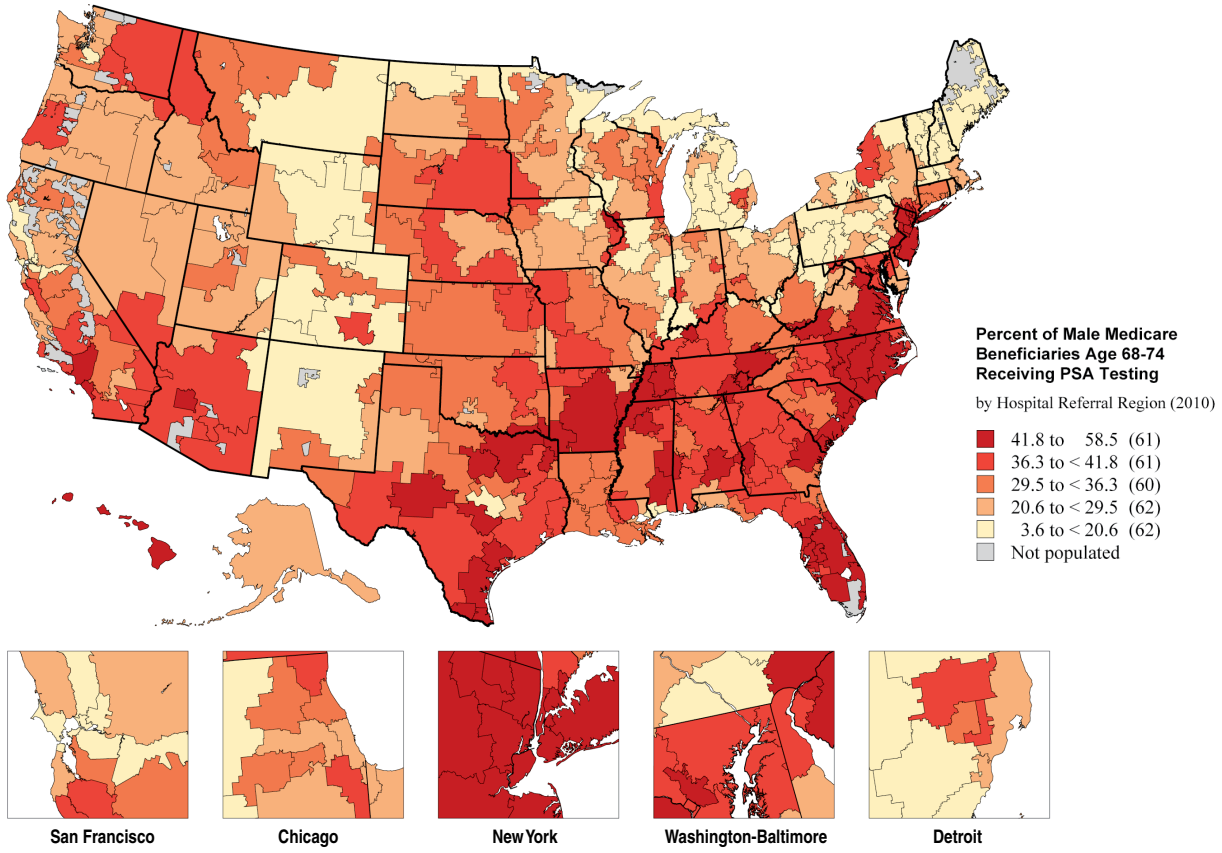
One thing for men to keep in mind is that prostate cancer treatments themselves can cause lasting problems or even death. This is an especially important consideration in light of the fact that many prostate cancers will not progress or cause symptoms within a man's lifetime. For men who would want to have treatment if cancer is found, the choice to have the PSA test will give them the opportunity to find and treat prostate cancer before it causes symptoms. Another way to think about this is the test may be right for men who worry more about the possible harms of cancer than about the possible harms of treatment. Other men choose not to have the test because they would rather not know about a cancer that may never cause problems. These men worry more about the possible harms of treatment than about the possible harms of the cancer.

Once early-stage prostate cancer has been diagnosed, a patient then must make a decision about how he wants to be treated. Active surveillance avoids the side effects of treatment, but men who choose this option run the risk that their cancer will progress and eventually cause symptoms or lead to death. This option also generally involves regular biopsies. Surgery may reduce the risk of dying of prostate cancer, but it has significant side effects. It is not clear that radiation reduces

Early-Stage Prostate Cancer

the risk of death for men diagnosed with early-stage prostate cancer, and it too has side effects. The differences in prostate cancer treatment across the country are reflected in the very high variation in rates of prostatectomy surgery during 2008-10 (Map 21).

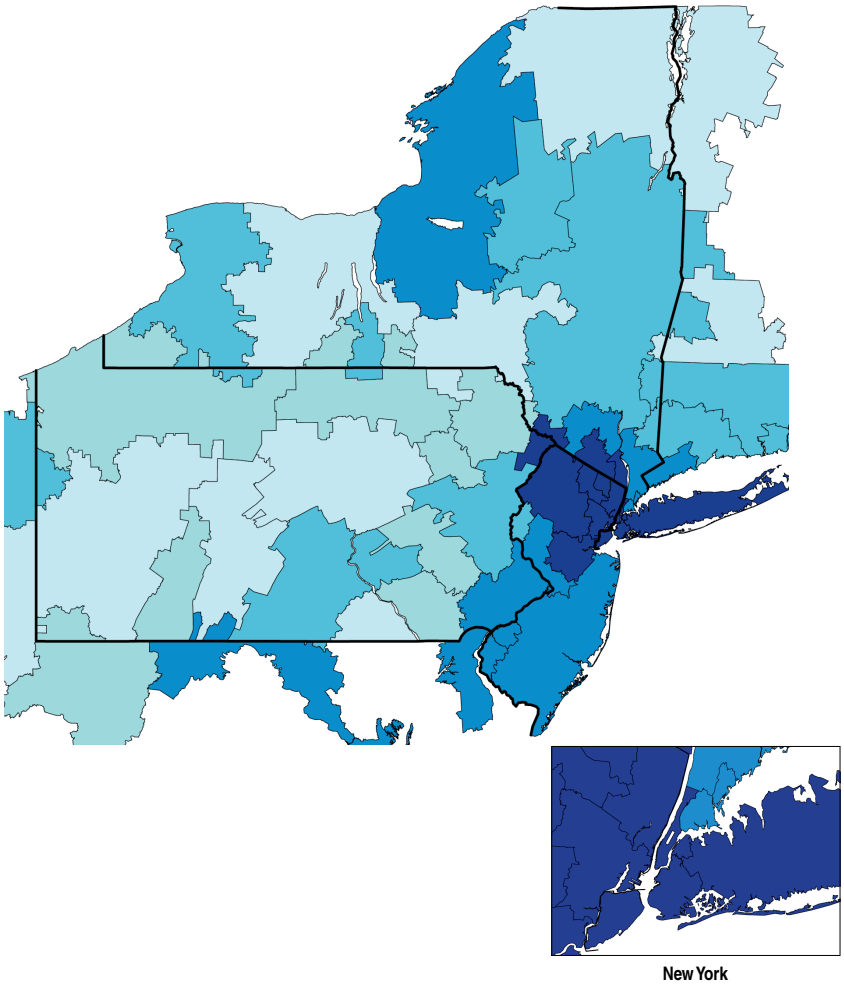
The decision about whether or not to undergo PSA screening should be shared between a clinician and a fully informed patient. Once an early-stage cancer is detected, the well-informed patient may choose to undergo immediate intervention to treat the prostate cancer, or he may wish to avoid immediate treatment and pursue active surveillance.



Map 19. Percent of male Medicare beneficiaries age 68-74 receiving prostate-specific antigen (PSA) testing among hospital referral regions (2010)

The colors on the map represent the percentages of male Medicare beneficiaries age 68-74 having PSA tests in each HRR. Rates are adjusted for race. Nearly 60% of men age 68-74 underwent PSA testing in the Miami HRR in 2010, more than fifteen times more than in the Lebanon, New Hampshire HRR, where less than 4% of men age 68-74 had a PSA test. In the U.S., on average, 34% of men age 68-74 underwent PSA testing in 2010.

There was high variation in the percentage of men receiving PSA testing among the HSAs that make up the Boston HRR. Less than 6% of men age 68-74 had PSA tests in the Winchester, Massachusetts HSA, while more than 40% of men—nearly 8 times more—received PSA testing in New Bedford.



Map 20. Percent of male Medicare beneficiaries age 68-74 receiving prostate-specific antigen (PSA) testing among hospital referral regions in the Middle Atlantic region (2010)

Rates of PSA testing varied sevenfold among HRRs in the Middle Atlantic region during 2010, from 7% in the Binghamton, New York HRR to 54% in the Paterson, New Jersey HRR.

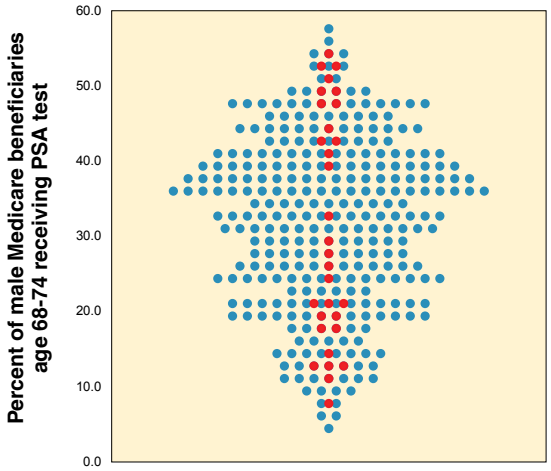
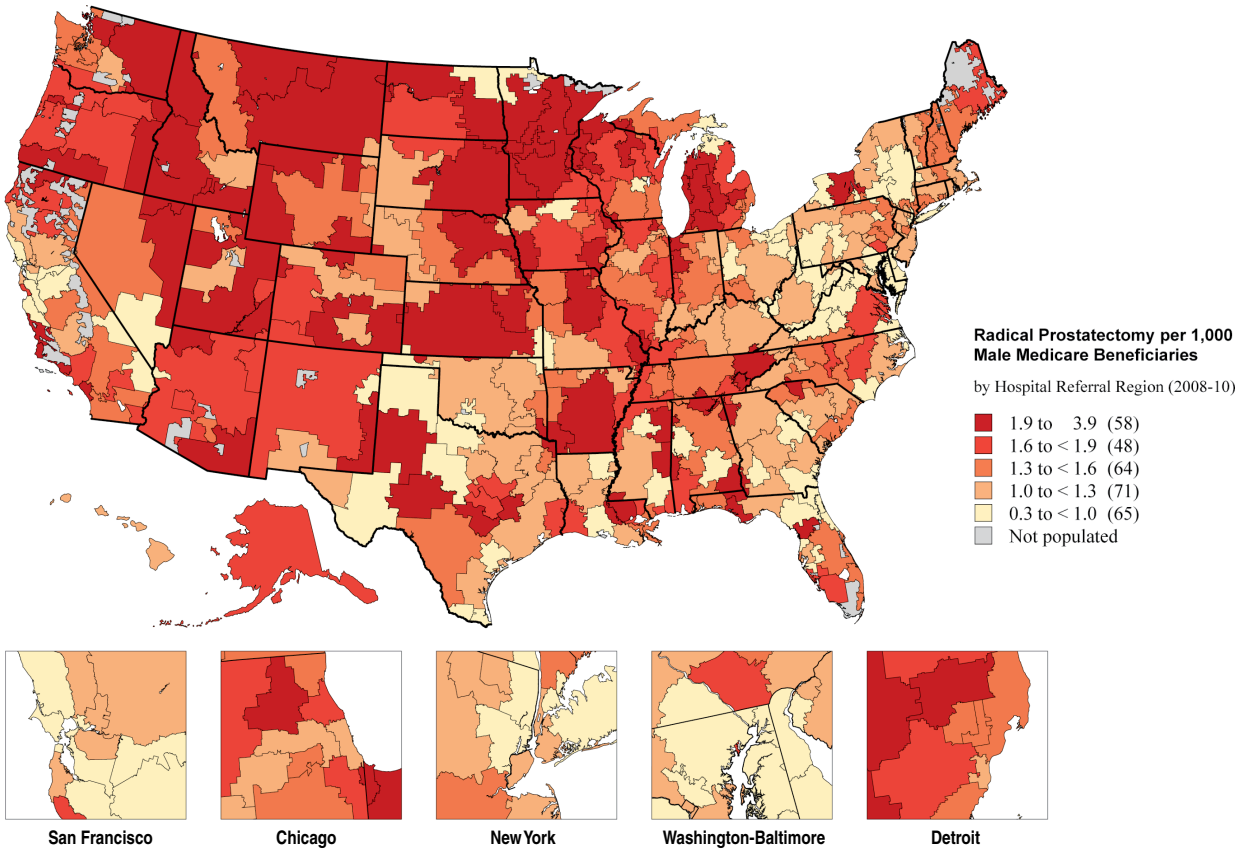


Figure 10. Percent of male Medicare beneficiaries age 68-74 receiving prostate-specific antigen (PSA) testing among hospital referral regions (2010)

Each blue dot represents the rate of PSA testing in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

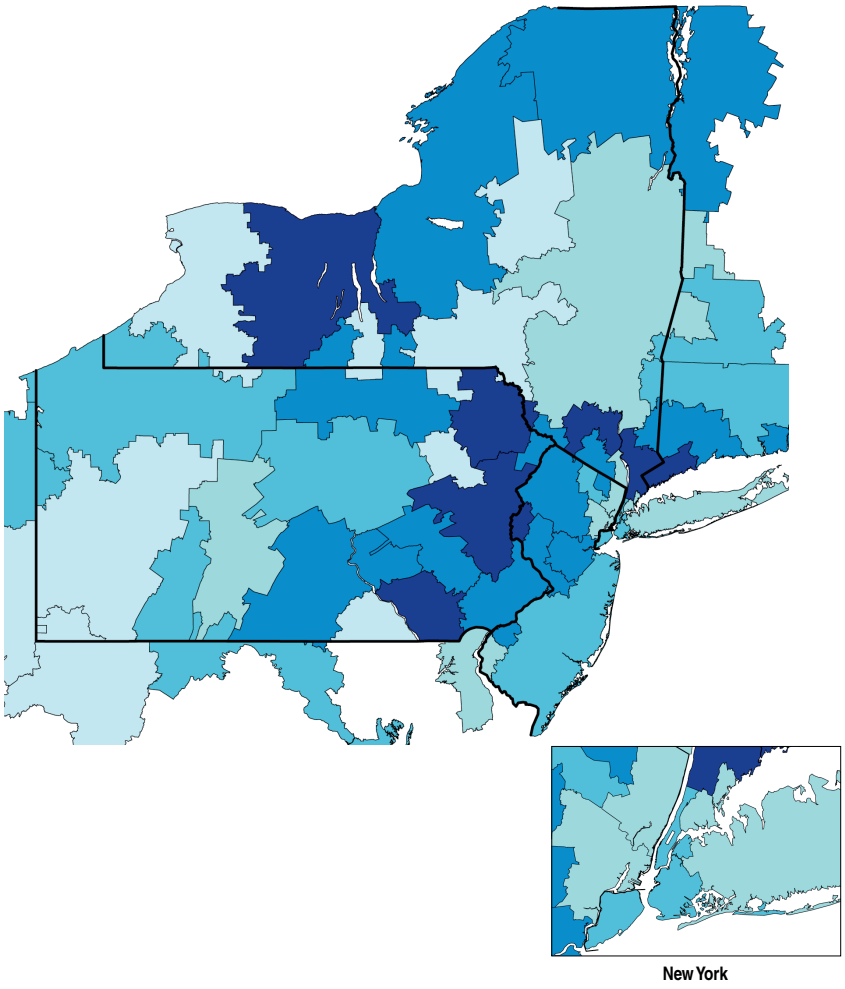
Early-Stage Prostate Cancer



Map 21. Radical prostatectomy per 1,000 male Medicare beneficiaries among hospital referral regions (2008-10)

The colors on the map represent the rates of surgical removal of the prostate (prostatectomy) per 1,000 male Medicare beneficiaries in each HRR. Rates are adjusted for age and race. Men over 65 enrolled in traditional Medicare living in Lansing, Michigan—where there were 3.8 surgeries per 1,000 during 2008-10—were about ten times more likely to undergo radical prostatectomy for prostate cancer than men living in York, Pennsylvania (0.4 per 1,000). The national average rate of prostatectomy was 1.4 procedures per 1,000 men.

The greatest variation within a single HRR was seen in Raleigh, North Carolina, where the rate of prostate surgery ranged from 0.6 per 1,000 male beneficiaries in the Fayetteville HSA to 2.5 per 1,000 male beneficiaries in the Raleigh HSA.



Radical Prostatectomy per 1,000 Male Medicare Beneficiaries

by Hospital Referral Region (2008-10)

- 1.4 to 2.0 (6)
- 1.2 to < 1.4 (10)
- 1.0 to < 1.2 (10)
- 0.8 to < 1.0 (7)
- 0.3 to < 0.8 (7)

Map 22. Radical prostatectomy per 1,000 male Medicare beneficiaries among hospital referral regions in the Middle Atlantic region (2008-10)

Among the HRRs in the Middle Atlantic region, radical prostatectomy rates varied by a factor of five, from 0.4 in the York, Pennsylvania HRR to 1.9 in Rochester, New York.

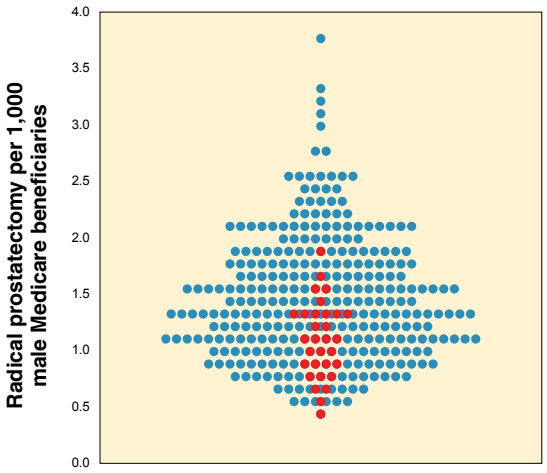


Figure 11. Radical prostatectomy per 1,000 male Medicare beneficiaries among hospital referral regions (2008-10)

Each blue dot represents the rate of radical prostatectomy in one of 306 HRRs in the U.S. The red dots indicate the rates in the 31 HRRs in the Middle Atlantic region.

Ensuring Patients Get the Care They Need and Want

Undergoing surgery is an important event in the life of any patient. So is taking a test, such as the PSA test, which can lead to a diagnosis of a disease that may or may not matter to the patient's health. Even the decision to undergo medical treatment with drugs involves important choices. Most patients need help to understand the trade-offs involved in treatment decisions. Many patients will then want to discuss their options with their clinicians and come to a shared decision about the best course of action.

For patients: becoming informed

If you are a patient facing a treatment choice or diagnostic decision (for example, PSA screening for prostate cancer), your primary care physician is one of the best resources to go to for more information. Two major primary care physician groups, the American College of Physicians and the American Academy of Family Physicians, have endorsed the practice of shared decision-making; so has the American Medical Association (AMA). According to a recent AMA statement, "although patients always have the right to participate in decisions about their medical treatment, using formal shared decision-making processes can be especially useful in cases where more than one treatment option is available, and no treatment is considered 'best' according to clinical evidence." [19]

Perhaps the most important aspect of sharing medical decisions is becoming fully informed. According to the AMA, one of the best ways for patients to become informed is with a "patient decision aid." A patient decision aid can be a brochure, a video or DVD, or a web-based interactive program. These aids are intended to help patients understand their condition, what is known about the possible treatments for it, and the potential benefits and risks of various treatment decisions. Aids should also help patients consider their personal values and how they might weigh their various treatment options based on how they feel about different possible outcomes.

Some patient decision aids are available for free on the Internet. They may also be provided as a service by your health insurer. Your primary care physician may be able to help you find the aid that is best for you, or you can ask your insurer to make aids available. Your clinician may also have someone in his or her office—such as a nurse or case manager—who can help you with the information in the aid. Once you have seen or read the decision aid, your physician or another clinician should be able to discuss your options with you and share important decisions about how you want to be treated, including many treatments that may be delivered by another physician, such as a surgeon.

If you have a condition that can be treated with either an elective surgery or a less invasive option, or if you are considering a screening test such as a PSA test, you may also want to know how likely it is that people in your area are receiving one treatment or another. This report provides information about your chances of undergoing one of the ten surgeries and the test detailed in the previous section,

depending upon where you live. If your clinician has recommended back or knee surgery, for example, you can find out the rate of each procedure in your community and compare that to the rate in other communities near you and in the rest of the U.S. Rates for all HRRs and HSAs are available at the Dartmouth Atlas web site (www.dartmouthatlas.org).

For clinicians: establishing an ethical standard of fully informing patients and engaging them in shared decision-making

The endorsement of shared decision-making and patient decision aids by major professional societies represents a significant shift in the concept of informed consent. Research has shown that the quality of medical decisions resulting from the usual process of informed consent is inadequate. Patients have unrealistic expectations of treatment benefits and harms, and clinicians are often poor judges of patients' values. As a consequence, people do not always get the best treatment for their condition,[4] and we see unwarranted variation in rates of treatment for preference-sensitive conditions such as those detailed in this report.[1]

Medical ethics dictates that patients have the right to understand the possible outcomes of their choices. The current ethical standard of informed consent does not ensure that patients are adequately informed.[20] Patient decision aids represent important tools for ensuring fully informed patients, and shared decision-making is essential to this process. According to the AMA statement, decision aids have three core elements: clinical information, "values clarification," and guidance to help patients make and communicate their treatment decisions. "The clinical information should reinforce what a patient has already learned from his or her physician, and give the patient the opportunity to consider the information in a different way, without being influenced by conscious or unconscious biases on the part of the physician."[19] Patient decision aids should also help patients examine their medical choices in light of their values. Many elective treatments and tests have important social and emotional effects, which patients may not be aware of, and clinicians may not take into account when recommending a treatment option.

While some patients may prefer not to participate in shared decision-making, research suggests that, compared with patients who receive usual care, patients who have access to patient decision aids, and whose physicians and nurses welcome and promote shared decision-making, have less conflict about their decisions, and make more informed, values-based decisions.[4] Clinical studies of patient decision aids and shared decision-making have shown an average 20% reduction in rates of several operations, depending upon the treatment.[4] However, this number reflects the average; some patients decide after shared decision-making to change their treatment choice from medication or watchful waiting to surgery.

Shared decision-making has important implications for reducing unwarranted variation in rates of treatment for preference-sensitive conditions. It may be tempting for policy makers and clinicians to think that a high rate of any given treatment means

that patients must be getting all the procedures they need and want. Conversely, they might think low rates of surgery represent a shortage of care. But a high rate of surgery is no guarantee that the *right* patients are undergoing surgery—patients who are appropriate candidates according to clinical guidelines *and* who want the surgery. By the same token, a low rate of surgery does not necessarily mean that patients are avoiding surgery they neither need nor want.[16]

For this reason, setting quotas for treatments is not the best approach to reducing unwarranted variation. The only way to ensure the rate is "right" is to recognize the need for fully informed patients and for clinicians and patients to share treatment decisions. For many treatments, including many surgeries and some tests, the right rate in a community will probably be lower than the current rate. For other treatments, the right rate may be higher. [21]

Three crucial steps remain in the process of establishing shared decision-making as the ethical standard of care. First, the 2010 Patient Protection and Affordable Care Act provides for the development of patient decision aids and for validating and disseminating them. Second, physicians and nurses will need to be trained in the use of decision aids and the process of sharing decisions. Finally, the legal standard of informed consent should be expanded for medical decisions involving elective procedures and tests.

Traditional disclosure required for legal informed consent does not lead to well-informed patients and thus fully informed choices.[21] The ethical importance of patients making fully informed choices has been recognized by the AMA.[19] States can also promote informed patient choice and shared decision-making by acknowledging the benefits of shared decision-making and offering clinicians legal protection if a competent patient signs a document affirming he or she has been informed and made a shared decision. In 2007, the Washington state legislature passed such legislation, and several other states are considering it.[22] Shared decision-making can remedy the omissions of traditional disclosure, promote better patient understanding of treatment options, and strengthen the therapeutic alliance between clinician and patient.

Appendix Table 1: Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital referral regions in the Middle Atlantic region

HRR name	HRR state	Medicare beneficiaries (2010)	Mastectomy (2008-10)	CABG (2010)	PCI (2010)	Back surgery (2010)	Knee replacement (2010)	Hip replacement (2010)	Carotid endarter-ectomy (2010)	Cholecyst-ectomy (2010)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Camden	NJ	353,438	0.9	3.2	7.8	2.6	7.7	3.8	1.9	3.4	3.0	44.0	1.0
Hackensack	NJ	142,179	1.0	3.1	6.5	2.7	5.8	3.4	1.2	3.3	3.2	52.8	0.8
Morristown	NJ	116,544	1.0	3.3	6.2	2.9	6.6	4.0	1.6	3.1	2.1	47.5	1.3
New Brunswick	NJ	106,442	0.7	2.9	7.6	2.8	6.1	3.5	1.5	2.8	3.8	48.8	1.3
Newark	NJ	129,592	1.0	3.4	9.0	1.6	5.1	2.8	1.2	3.0	2.7	47.9	0.9
Paterson	NJ	41,727	0.8	3.6	6.5	2.6	6.6	2.8	1.5	4.1	2.8	53.7	1.1
Ridgewood	NJ	48,566	0.9	3.3	7.1	2.7	6.5	4.1	1.2	3.6	2.3	49.3	1.3
Albany	NY	191,849	0.6	2.8	4.0	3.3	7.8	4.1	2.1	3.0	2.0	28.3	1.0
Binghamton	NY	42,940	0.6	2.9	4.6	3.2	8.3	4.3	1.8	2.8	3.0	7.2	0.6
Bronx	NY	64,499	1.0	2.1	7.8	2.2	4.6	2.4	1.3	2.3	3.0	41.8	0.9
Buffalo	NY	91,169	0.9	3.1	4.7	3.3	7.1	3.9	1.0	2.4	2.5	26.4	0.5
Elmira	NY	37,071	0.9	3.4	8.3	3.1	9.5	4.7	3.3	3.3	2.4	32.6	0.7
East Long Island	NY	440,921	1.0	3.2	10.8	2.7	5.9	3.4	1.4	2.8	2.4	52.9	0.9
Manhattan	NY	362,914	0.8	1.9	10.8	2.6	4.5	2.9	0.9	2.1	3.3	51.5	1.1
Rochester	NY	73,258	1.0	3.1	7.7	3.9	7.9	3.8	1.5	1.7	1.3	12.7	1.9
Syracuse	NY	109,593	0.7	3.5	5.7	2.7	8.1	4.2	2.3	3.2	1.2	38.7	1.3
White Plains	NY	123,415	0.8	2.5	7.1	3.2	6.4	4.1	1.3	2.3	3.4	41.8	1.5
Allentown	PA	136,734	0.9	3.6	7.2	3.8	9.1	4.0	2.1	3.4	3.4	29.5	1.5
Altoona	PA	26,211	0.9	3.1	16.3	4.5	8.8	3.6	2.3	4.0	5.1	13.0	0.8
Danville	PA	52,572	0.9	2.2	5.3	4.9	9.2	3.6	1.7	3.1	2.5	12.7	1.1
Erie	PA	73,637	1.0	4.1	9.0	4.7	8.8	4.2	2.2	2.9	2.4	19.0	1.0
Harrisburg	PA	101,564	0.6	3.6	8.4	5.0	10.2	4.5	1.4	2.9	2.4	24.5	1.2
Johnstown	PA	16,766	0.4	3.5	14.8	5.5	8.7	3.3	1.5	2.7	3.5	18.1	1.1
Lancaster	PA	66,184	0.9	3.2	7.3	7.0	10.4	3.8	1.5	3.0	1.7	18.4	1.7
Philadelphia	PA	344,626	1.1	2.7	7.4	3.0	7.3	3.6	1.3	3.1	2.9	42.5	1.3
Pittsburgh	PA	202,563	0.9	3.6	9.2	4.6	8.4	3.9	2.0	3.6	2.5	14.9	0.7
Reading	PA	58,153	1.1	2.6	8.3	3.8	10.4	3.5	1.9	3.7	3.0	20.5	1.3
Sayre	PA	23,860	1.6	3.0	9.9	4.4	8.7	5.1	1.4	2.9	2.4	21.8	1.4
Scranton	PA	42,756	1.2	4.1	8.0	3.1	10.0	3.6	2.3	3.1	1.6	20.4	1.5
Wilkes-Barre	PA	32,906	1.3	3.9	7.7	3.0	8.9	3.2	2.9	3.3	1.1	20.1	0.8
York	PA	45,214	0.4	2.6	5.2	4.6	8.8	3.8	1.3	2.8	2.6	10.7	0.4
United States		28,083,795	0.9	3.2	7.5	4.7	9.0	3.9	1.9	3.3	2.7	34.5	1.4

All rates are adjusted for age, race, and sex (when appropriate). Surgical rates are expressed as rates per 1,000 Medicare beneficiaries. Some are for events occurring in 2010 only; others are averages for the three-year period from 2008 to 2010. Only surgical procedures performed during a hospital admission are included. Rates for mastectomy and prostate surgery are sex-specific. PSA testing rates are expressed as the percent of male beneficiaries age 68-74 who received a test during 2010. They are adjusted for race only. Data exclude Medicare beneficiaries who were members of risk-bearing health maintenance organizations.

For surgical procedures, regions with fewer than 26 expected cases are shown in parentheses in the table. All rates with 10 or fewer cases during the study period are omitted.

Specific codes used to define the numerators for rates, and methods of age, sex, and race adjustment, are included in the Appendix on Methods.

CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; TURP for BPH = transurethral resection of the prostate for benign prostatic hyperplasia; PSA = prostate-specific antigen

Appendix Table 2: Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Atlantic City	NJ	67,013	0.8	3.2	11.5	3.1	8.0	3.5	1.2	3.1	3.5	38.1	0.5
Bayonne	NJ	20,061		4.1	10.8	1.9	3.9	2.2	1.5	3.7	(1.5)	51.5	
Belleville	NJ	19,893		4.8	12.7	1.8	5.3	2.4	1.5	4.1	(2.9)	54.4	
Bridgeton	NJ	28,768		3.5	9.1	3.8	7.9	3.3	2.2	3.6	4.9	43.3	
Camden	NJ	164,120	0.9	2.9	7.4	2.0	6.9	3.4	1.6	4.0	4.2	44.5	1.1
Cape May Court Hse.	NJ	39,903	(1.1)	2.7	7.3	4.1	10.0	4.4	1.6	4.4	3.7	45.3	(1.8)
Denville	NJ	43,437	(1.2)	3.3	9.0	2.6	7.0	3.3	2.0	3.4	2.5	52.4	1.6
Dover	NJ	44,478	(1.1)	3.3	9.0	2.6	7.0	3.5	2.4	3.7	3.0	45.7	1.0
Edison	NJ	59,386	0.7	3.4	9.7	2.3	5.7	3.0	2.3	3.0	4.9	50.5	1.3
Elizabeth	NJ	47,736	(0.9)	3.2	9.4	1.6	4.4	2.8	1.0	3.4	2.4	44.6	0.5
Elmer	NJ	12,267		3.4	8.1	2.1	7.6	3.8	(2.2)	4.6	(4.1)		
Englewood	NJ	59,244	1.0	2.4	6.8	3.6	5.8	3.3	1.4	3.5	3.3	53.2	0.9
Flemington	NJ	37,959	(0.6)	3.4	8.2	3.3	5.9	4.2	1.1	2.5	1.9	44.2	(1.4)
Freehold	NJ	44,235	(0.9)	2.7	8.0	2.8	6.4	3.8	2.0	3.7	3.9	41.9	0.7
Hackensack	NJ	50,941	1.0	4.1	8.8	2.4	5.4	3.6	2.0	3.6	3.1	56.4	0.8
Hackettstown	NJ	14,513		5.4	9.8	1.7	6.3	3.5	2.1	3.4	(2.1)		
Hammonton	NJ	9,865		2.8	10.7	2.7	6.5	3.3	(2.0)	5.1			
Hoboken	NJ	23,914		3.7	12.3	1.3	3.3	1.6	0.8	3.9	5.6	33.3	
Holmdel	NJ	36,039	(1.3)	4.1	13.6	2.9	6.0	3.2	2.9	3.6	2.1	37.9	(1.6)
Irvington	NJ	9,169		(2.7)	15.1		5.3	(2.3)		1.8			
Jersey City	NJ	44,371	(1.5)	3.5	12.5	0.8	3.2	1.6	1.3	3.7	3.9	45.9	0.6
Kearny	NJ	19,943		4.7	13.2	1.4	4.8	3.2	1.5	3.8	(1.8)	49.3	
Lakewood	NJ	54,214	0.8	3.6	11.7	2.1	7.7	3.2	1.6	3.6	2.6	50.7	1.0
Livingston	NJ	43,866	(1.3)	3.6	5.5	2.6	4.8	3.6	1.2	2.1	3.0	51.4	(2.2)
Long Branch	NJ	28,817	(0.9)	3.3	9.4	2.4	6.6	4.0	3.1	2.5	2.0	42.4	
Manahawkin	NJ	50,711	(0.9)	3.7	11.6	2.1	8.9	4.0	2.4	4.0	4.3	44.0	0.9
Montclair	NJ	55,970	1.0	3.4	8.9	2.1	6.0	3.3	1.4	3.2	3.2	45.7	1.2
Morristown	NJ	74,307	1.0	3.3	6.1	3.5	7.4	4.5	1.3	2.6	1.6	55.0	1.6
Mount Holly	NJ	56,313	0.8	2.3	7.9	3.2	8.3	3.8	1.3	3.3	3.2	41.7	1.1
Neptune	NJ	52,885	1.0	3.1	9.0	2.5	7.6	4.5	2.0	1.9	1.6	48.8	1.1
New Brunswick	NJ	88,560	0.5	3.5	10.2	2.6	5.6	3.0	1.7	3.1	3.4	48.1	1.3
Newark	NJ	56,053	0.9	3.5	15.9	1.2	4.9	2.3	1.2	3.6	2.3	46.1	0.7
Newton	NJ	27,969	(0.7)	4.3	8.1	2.7	6.1	3.7	2.1	3.8	1.4	39.1	(1.7)
North Bergen	NJ	31,726	(1.4)	3.1	12.6	1.8	4.1	1.8	0.7	4.0	5.2	49.3	(1.0)
Orange	NJ	13,057		4.7	13.9	2.3	4.4	1.7		2.3			
Paramus	NJ	13,394	(1.5)	3.3	7.8	2.0	5.9	3.2	1.6	3.6	(2.6)		
Passaic	NJ	68,084	1.1	3.6	8.9	1.7	4.5	2.6	2.0	3.4	3.7	53.2	
Paterson	NJ	38,390	(1.0)	3.7	9.5	2.3	5.8	2.2	1.6	4.2	3.4	56.2	

All rates are adjusted for age, race, and sex (when appropriate). Surgical rates are expressed as rates per 1,000 Medicare beneficiaries. Some are for events occurring in 2010 only; others are averages for the three-year period from 2008 to 2010. Only surgical procedures performed during a hospital admission are included. Rates for mastectomy and prostate surgery are sex-specific. PSA testing rates are expressed as the percent of male beneficiaries age 68-74 who received a test during 2010. They are adjusted for race only. Data exclude Medicare beneficiaries who were members of risk-bearing health maintenance organizations.

For surgical procedures, hospital service areas with fewer than 26 expected cases are shown in parentheses in the table. All rates for HSAs with 10 or fewer cases during the study period are omitted.

Specific codes used to define the numerators for rates, and methods of age, sex, and race adjustment, are included in the Appendix on Methods.

CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; TURP for BPH = transurethral resection of the prostate for benign prostatic hyperplasia; PSA = prostate-specific antigen

Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Perth Amboy	NJ	11,160		4.3	15.5	1.7	2.9	1.9	(1.9)	3.7	(4.8)		(2.4)
Phillipsburg	NJ	30,030	(0.9)	4.5	9.6	3.6	7.1	4.2	1.9	4.0	3.5	24.0	(1.4)
Plainfield	NJ	40,793	(1.0)	3.1	8.8	2.6	5.6	3.6	1.7	2.5	2.0	45.8	
Point Pleasant	NJ	56,157	0.9	4.4	11.2	2.1	8.2	4.4	2.3	3.2	1.9	50.7	1.4
Pompton Plains	NJ	45,312	(0.7)	3.1	7.1	2.7	6.7	3.4	1.7	3.5	2.4	49.5	(1.6)
Princeton	NJ	87,809	0.7	2.7	7.8	3.2	6.4	4.1	1.4	2.5	3.7	49.6	1.5
Rahway	NJ	24,769	(0.7)	4.2	13.3	2.0	5.5	3.7	2.5	3.1	4.6	41.2	
Red Bank	NJ	44,348	(1.2)	2.9	8.5	2.9	6.9	3.9	2.9	4.0	2.0	47.0	1.0
Ridgewood	NJ	79,197	0.9	3.5	8.5	2.8	7.0	4.4	1.4	4.1	1.9	52.1	1.5
Riverside	NJ	18,145		2.8	7.6	2.5	7.7	3.0	1.3	2.9	(5.0)	52.3	
Salem	NJ	20,609		3.8	7.6	3.8	8.7	3.0	2.7	4.6	(3.5)	36.8	(1.3)
Secaucus	NJ	6,288		(3.7)	10.0	1.7	6.3	(3.1)		(6.4)			
Somers Point	NJ	30,443	(0.7)	2.8	7.3	3.6	9.1	3.9	1.6	3.3	3.8	37.9	(1.6)
Somerville	NJ	49,854	(0.8)	2.2	6.4	3.0	6.3	3.8	1.5	3.1	3.0	50.4	1.0
South Amboy	NJ	18,113		3.8	12.1	1.5	5.0	2.8	2.5	3.1	(4.3)	44.6	
Stratford	NJ	51,193	0.6	3.4	7.3	2.6	7.3	3.3	2.1	4.2	4.0	42.7	1.2
Summit	NJ	60,062	0.6	3.0	5.9	2.4	6.5	4.0	1.0	2.4	1.7	53.2	1.6
Sussex	NJ	16,951		3.3	8.5	3.1	6.3	4.5	2.6	3.1	(2.8)	50.8	(1.3)
Teaneck	NJ	55,922	0.9	3.0	7.5	2.8	5.7	3.2	1.7	3.8	3.4	47.7	1.1
Toms River	NJ	154,050	0.7	4.5	11.8	2.1	7.5	4.0	2.8	3.8	1.2	43.3	0.9
Trenton	NJ	95,956	1.5	3.1	9.3	2.5	7.4	3.5	1.8	3.8	3.3	46.1	1.3
Union	NJ	34,575	(0.9)	3.8	7.0	2.0	5.9	3.0	1.5	2.3	1.8	50.0	
Vineland	NJ	24,737	(1.2)	3.3	8.2	2.1	5.6	2.6	2.3	3.4	3.4	36.9	
Wayne	NJ	39,580	(0.8)	4.1	7.8	2.6	6.0	3.3	1.7	4.4	2.7	56.7	(1.1)
Westwood	NJ	45,804	(0.9)	3.1	6.0	2.7	6.2	3.8	1.7	3.9	2.2	54.3	(1.4)
Willingboro	NJ	27,963	(1.0)	3.0	9.6	3.4	7.4	2.5	1.2	4.2	4.1	49.4	
Woodbury	NJ	45,173	(1.0)	3.6	9.5	2.7	8.2	3.4	2.7	3.9	3.5	39.6	(1.3)
Albany	NY	85,169	0.2	3.0	3.5	3.5	6.8	4.2	2.6	3.0	0.9	36.6	0.8
Alexandria Bay	NY	4,055		(5.7)	6.4	(3.8)	4.8	(5.5)		(3.4)			
Amityville	NY	40,871	(1.3)	4.3	13.6	2.8	6.4	3.4	2.1	3.7	2.5	56.6	
Amsterdam	NY	19,514		4.1	3.5	1.8	7.6	3.3	3.6	2.1	(3.1)	0.0	
Auburn	NY	28,473		4.7	6.4	2.8	6.7	3.8	1.7	3.7		43.7	(1.4)
Batavia	NY	12,897		3.6	9.5	3.8	8.7	3.9	1.3	2.9		15.0	
Bath	NY	8,790		2.7	6.7	2.0	6.7	4.2	(2.1)	1.8			
Bay Shore	NY	52,673	1.3	4.3	12.6	1.8	5.7	3.4	2.1	2.5	1.9	49.2	0.7
Bethpage	NY	41,276	(1.0)	4.0	11.9	2.2	6.2	3.6	2.0	4.1	1.8	58.3	
Binghamton	NY	88,983	0.6	3.0	3.9	4.6	7.9	4.4	2.4	3.2	2.7	5.7	0.5
Brockport	NY	4,993		(4.3)	15.9	(4.0)	7.1	(4.6)		(2.2)			

All rates are adjusted for age, race, and sex (when appropriate). Surgical rates are expressed as rates per 1,000 Medicare beneficiaries. Some are for events occurring in 2010 only; others are averages for the three-year period from 2008 to 2010. Only surgical procedures performed during a hospital admission are included. Rates for mastectomy and prostate surgery are sex-specific. PSA testing rates are expressed as the percent of male beneficiaries age 68-74 who received a test during 2010. They are adjusted for race only. Data exclude Medicare beneficiaries who were members of risk-bearing health maintenance organizations.

For surgical procedures, hospital service areas with fewer than 26 expected cases are shown in parentheses in the table. All rates for HSAs with 10 or fewer cases during the study period are omitted.

Specific codes used to define the numerators for rates, and methods of age, sex, and race adjustment, are included in the Appendix on Methods.

CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; TURP for BPH = transurethral resection of the prostate for benign prostatic hyperplasia; PSA = prostate-specific antigen

Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Bronx	NY	158,969	1.0	2.2	7.8	1.7	4.2	1.7	1.0	2.2	3.0	39.8	0.7
Bronxville	NY	28,226	(1.3)	2.6	8.2	3.2	5.3	4.3	1.1	3.1	3.3	41.0	
Brooklyn	NY	446,291	0.8	2.3	14.4	1.6	3.8	1.9	0.9	2.5	3.8	58.6	1.0
Buffalo	NY	146,134	1.0	3.2	4.4	2.9	6.6	3.8	1.0	2.3	2.6	35.4	0.4
Cambridge	NY	5,929		(3.7)	3.8	3.6	7.8	(3.8)		(2.3)			
Canandaigua	NY	13,440		2.7	4.3	5.1	9.6	4.6	2.2	2.3			(2.4)
Carmel	NY	28,684	(0.8)	2.8	8.1	3.0	7.1	4.6	2.1	3.4	3.8	46.6	(1.9)
Carthage	NY	4,233		(5.5)	7.7	(2.5)	6.9	(6.4)	(5.0)	(3.7)			
Catskill	NY	26,251		2.7	4.3	2.7	7.4	4.0	2.1	3.3	3.7	18.0	
Clifton Springs	NY	4,978		(2.3)	7.2	(4.4)	8.5	(3.1)	(2.1)				
Cobleskill	NY	9,145		3.4	6.1	2.6	7.6	4.2	(2.4)	3.8	(3.7)		
Cold Spring	NY	2,125					(12.5)						
Cooperstown	NY	16,013	(1.3)	3.9	7.3	2.8	7.7	4.8	1.8	2.9	(4.3)	0.0	
Corning	NY	16,723		3.3	8.0	4.2	10.0	4.7	1.6	2.9	(1.7)	19.2	
Cornwall	NY	20,742	(1.2)	3.4	9.7	3.0	7.3	3.6	2.5	2.6	(1.4)	31.9	
Cortland	NY	18,484		4.3	7.2	3.2	6.7	2.9	2.9	3.1		20.9	
Cuba	NY	2,478		(4.1)	(11.9)	(5.1)							
Dansville	NY	7,490		(4.5)	8.8	5.2	7.5	3.3	(1.9)	2.6			
Dobbs Ferry	NY	6,161		(2.4)	7.4	3.6	5.5	(4.1)		(1.9)	(6.6)		
Dunkirk	NY	8,775		3.3	8.0	2.8	6.3	3.0		5.0			
East Meadow	NY	33,387	(1.0)	3.8	11.3	2.8	5.5	2.9	1.7	3.4	2.4	54.8	
Elizabethtown	NY	3,016		(4.1)	(7.8)		6.5						
Ellenville	NY	3,421			11.4		7.0	(3.5)		(4.1)			
Elmira	NY	32,444	(0.8)	3.0	6.6	4.1	9.2	4.6	2.2	3.4	3.2	20.1	(0.9)
Far Rockaway	NY	41,472	(1.1)	2.9	12.1	2.5	4.6	3.2	0.5	2.9	4.3	59.6	
Flushing	NY	221,971	0.7	2.2	10.3	2.1	5.0	2.3	0.8	2.5	2.8	56.6	0.8
Fulton	NY	8,769		4.4	6.4	3.6	7.4	3.1	(3.5)	3.0			
Geneva	NY	12,637		3.2	10.8	4.9	6.4	3.8	2.0	2.6			(2.3)
Glen Cove	NY	29,138	(1.3)	3.7	10.7	3.6	6.5	4.6	0.9	4.9	2.5	53.9	(1.0)
Glens Falls	NY	42,622	(1.0)	3.7	3.8	3.5	8.1	4.3	2.0	3.0	2.1	20.9	0.9
Gloversville	NY	14,724		3.2	3.2	2.1	9.8	4.8	2.4	1.9	(2.3)		
Goshen	NY	20,970		3.7	10.8	2.9	5.7	3.3	1.7	2.3	(3.3)	43.1	(1.4)
Gouverneur	NY	3,598		(5.6)	7.6		9.9	(6.1)					
Gowanda	NY	3,983		(2.6)	3.4	(3.7)	6.9	(4.6)					
Greenport	NY	13,580	(1.4)	3.7	8.3	2.5	7.6	4.4	2.7	2.6		27.1	
Hamilton	NY	8,223		3.4	6.9	2.1	10.3	6.7	(3.1)	2.6			
Harris	NY	21,559	(1.2)	3.5	10.9	1.8	6.1	3.8	2.2	2.5	2.8	37.4	
Hornell	NY	8,537		3.5	9.4	3.6	6.6	3.2		2.8			

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For surgical procedures, hospital service areas with fewer than 26 expected cases are shown in parentheses in the table. All rates for HSAs with 10 or fewer cases during the study period are omitted.

Specific codes used to define the numerators for rates, and methods of age, sex, and race adjustment, are included in the Appendix on Methods.

CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; TURP for BPH = transurethral resection of the prostate for benign prostatic hyperplasia; PSA = prostate-specific antigen

Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Huntington	NY	78,150	1.0	3.6	12.0	3.2	6.0	4.3	1.4	2.8	1.7	53.9	1.1
Irving	NY	4,072		(3.8)	3.6		6.5	(6.0)		(3.4)			
Ithaca	NY	26,539	(0.7)	3.4	5.7	2.6	6.2	4.8	1.4	2.2	1.6	21.9	(1.6)
Jamaica	NY	124,584	0.8	2.6	13.5	1.5	5.1	2.3	1.2	2.7	3.0	50.4	0.9
Jamestown	NY	23,103	(1.3)	2.7	6.5	3.0	5.9	4.1	1.5	2.1	1.4	25.7	
Kenmore	NY	22,023	(1.0)	3.1	5.1	3.1	7.1	4.8	1.2	1.8	2.6	28.4	
Kingston	NY	48,987		3.5	3.6	3.3	7.5	4.3	2.0	3.4	2.1	53.0	1.4
Lackawanna	NY	4,551		(4.4)	4.4		3.8	(3.5)		(2.4)			
Lewiston	NY	15,077		3.4	8.7	4.5	6.8	3.4	2.9	2.1		14.1	
Little Falls	NY	5,865		(3.2)	7.9		7.9	(4.5)	(3.1)	(1.8)			
Lockport	NY	13,228		3.7	7.8	2.2	5.4	4.1	1.4	2.5	(2.8)		
Long Beach	NY	20,235	(1.3)	3.0	11.4	2.7	4.9	4.3	1.4	2.6	(3.0)	54.9	
Long Island City	NY	27,972	(0.9)	2.4	15.5	1.3	5.1	2.0	1.2	2.7	2.2	50.8	
Lowville	NY	7,064		(3.7)	10.3	2.1	11.3	5.0	(3.1)	(3.0)			
Malone	NY	11,606		3.8	7.4	1.8	5.1	3.4	(1.4)	4.6	(2.5)	0.0	
Manhasset	NY	75,443	0.8	3.3	10.5	3.4	5.8	4.1	1.2	3.1	3.4	59.8	1.4
Margaretville	NY	4,635		(4.0)	4.7	(3.6)	6.6	(3.4)		(2.7)			
Massena	NY	7,684		3.6	8.6	3.6	6.0	4.2	(1.6)	2.8			
Medina	NY	7,055		(2.8)	8.8	2.7	4.9	3.8	(1.9)	(2.0)	(4.0)		
Middletown	NY	32,590	(0.8)	3.4	11.3	2.8	6.9	3.3	2.5	2.9	3.9	51.7	(1.3)
Mineola	NY	67,813	1.1	4.0	11.3	2.3	6.0	3.8	1.4	3.3	2.7	54.8	0.8
Montour Falls	NY	5,285		(3.9)	5.8	(3.5)	10.2	(4.8)	(2.0)	(4.5)			
Mount Kisco	NY	50,042	(0.8)	2.7	7.4	3.7	6.6	4.7	1.3	2.7	4.1	38.4	2.3
Mount Vernon	NY	16,615		2.9	8.0	2.3	6.4	3.5	(1.0)	2.4	(3.5)		
New Rochelle	NY	34,152	(1.1)	3.5	8.8	3.4	6.5	5.1	1.5	2.4	3.0	48.0	(2.1)
Manhattan	NY	493,479	0.9	1.8	8.9	3.0	4.5	3.5	0.8	1.9	3.2	45.6	1.4
Newark	NY	8,389		4.0	11.2	4.1	7.5	2.6	(1.5)	2.1			(3.3)
Newburgh	NY	24,219		3.5	8.3	3.2	7.5	3.9	2.1	2.8	1.1	34.2	(1.6)
Newfane	NY	4,088		(3.9)	6.7	(5.5)	6.1	(5.4)		(3.4)			
Niagara Falls	NY	7,853		(4.2)	7.7	2.1	5.9	1.5		2.3			
North Tarrytown	NY	32,217		2.6	5.3	3.4	6.9	4.0	1.3	2.3	6.7	32.7	(2.1)
North Tonawanda	NY	8,762		2.7	5.6	3.1	7.0	5.6		1.8			
Norwich	NY	9,258		2.6	3.5	2.8	7.6	4.4	(1.3)	1.9			
Nyack	NY	67,391	0.7	3.0	7.2	2.5	6.1	4.1	1.2	3.2	1.4	59.4	0.7
Oceanside	NY	59,673	0.9	3.6	12.7	3.0	5.2	4.1	1.7	3.1	3.0	54.9	0.8
Ogdensburg	NY	9,688		4.1	6.8	1.9	8.0	3.9	(2.0)	4.5			
Olean	NY	18,142		4.4	8.4	3.3	6.7	3.7	2.3	3.4	(3.2)	23.5	
Oneida	NY	13,368		3.4	10.3	3.3	7.1	4.0	2.8	1.8			

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For surgical procedures, hospital service areas with fewer than 26 expected cases are shown in parentheses in the table. All rates for HSAs with 10 or fewer cases during the study period are omitted.

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CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; TURP for BPH = transurethral resection of the prostate for benign prostatic hyperplasia; PSA = prostate-specific antigen

Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Oneonta	NY	17,877		3.3	7.3	2.6	8.6	3.0	2.3	2.4	(3.8)	0.0	
Oswego	NY	12,887		5.1	6.0	2.3	8.3	3.3	2.5	1.5	(2.3)		
Patchogue	NY	50,708	(1.3)	3.5	11.8	2.4	5.9	3.1	2.1	3.4	1.5	47.6	0.9
Peekskill	NY	22,847	(1.2)	3.4	7.6	2.2	5.6	4.3	1.4	3.5	5.0	43.3	(1.4)
Penn Yan	NY	6,356		(3.3)	6.4	3.3	9.9	(5.5)	(2.8)	(2.0)			
Plainview	NY	26,079	(1.1)	3.5	10.4	2.9	6.8	3.5	1.4	3.5	1.8	58.8	
Plattsburgh	NY	31,651	(1.1)	4.1	8.7	3.0	7.1	3.3	2.4	3.6	3.3	0.0	(0.9)
Port Chester	NY	27,762	(0.9)	3.0	6.5	3.5	5.9	4.5	1.3	2.4	2.0	41.0	(1.7)
Port Jefferson	NY	71,601	0.8	3.6	10.1	2.7	6.9	3.8	1.8	3.0	1.4	52.3	1.6
Port Jervis	NY	21,296	(1.8)	3.9	8.3	3.8	6.9	3.2	1.6	3.8	3.4	28.3	
Potsdam	NY	14,590		3.8	8.9	2.2	7.1	4.4	1.5	3.3		0.0	
Poughkeepsie	NY	79,751	0.5	3.1	4.2	2.7	7.7	3.6	2.5	2.9	2.7	44.5	0.9
Rhinebeck	NY	9,658		4.0	2.8	2.5	9.3	4.0	(2.4)	3.3			
Riverhead	NY	29,255	(1.2)	3.7	10.4	2.9	6.8	3.9	1.6	3.1	1.0	38.7	(1.0)
Rochester	NY	106,591	1.0	2.9	9.0	3.5	7.5	3.5	1.5	1.7	1.2	15.2	2.1
Rockville Centre	NY	31,731	(1.7)	3.3	10.2	2.4	5.4	3.6	1.4	3.9	3.0	53.1	
Rome	NY	22,466	(1.3)	4.2	8.1	2.2	6.5	3.2	4.1	4.1		29.8	
Saranac Lake	NY	11,575		2.2	6.5	2.4	7.9	4.2	(1.6)	3.5			
Saratoga Springs	NY	23,837		3.4	3.2	3.7	7.8	3.9	3.1	2.5	2.5	22.3	(1.0)
Schenectady	NY	65,457	0.5	2.8	3.1	3.3	7.2	3.7	2.2	3.2	1.5	38.6	1.1
Seaford	NY	7,123		(5.3)	11.5	3.8	8.1	5.1	(1.5)	(2.6)			
Sidney	NY	8,223		1.9	5.1	3.8	6.3	3.5	(2.5)	2.9	(5.0)		
Smithtown	NY	67,405	0.9	3.4	12.0	2.8	5.8	3.6	1.8	2.7	1.4	55.1	1.0
Sodus	NY	4,799		(2.2)	14.2	(3.6)	5.6	(3.1)					
Southampton	NY	30,925	(1.4)	2.9	8.8	3.1	6.9	4.9	2.5	3.9	1.3	29.3	(1.6)
Springville	NY	4,812		(4.8)	7.4	(3.8)	5.7	(3.1)		(3.3)			
Star Lake	NY	1,789		(5.5)	(6.9)								
Staten Island	NY	93,079	0.6	3.4	9.4	2.2	4.7	3.2	1.6	2.3	2.1	49.1	0.5
Stony Brook	NY	9,932		3.4	9.3	1.9	5.0	4.3	(1.3)	2.6			
Suffern	NY	33,530	(0.9)	3.6	6.8	2.0	5.4	3.4	1.5	3.1	2.5	51.4	(0.9)
Syosset	NY	18,781	(1.2)	2.6	10.5	3.2	6.2	4.0	1.3	2.8	(2.1)	55.3	
Syracuse	NY	168,837	0.5	3.1	5.3	3.0	7.9	4.3	2.1	2.9	0.8	55.1	1.4
Ticonderoga	NY	5,187		(4.3)	8.3	(2.0)	7.1	(3.3)	(2.9)	(2.5)			
Troy	NY	38,763	(0.6)	3.4	5.9	3.7	7.2	3.9	3.6	4.1	1.3	29.2	
Utica	NY	71,714	1.0	4.1	9.6	2.3	9.1	4.5	3.2	3.5	1.9	41.1	0.5
Valley Stream	NY	39,603	(1.1)	3.8	12.3	2.6	4.9	2.8	1.5	3.5	2.0	65.8	(0.8)
Walton	NY	3,636		(4.1)		(3.4)	7.5			(3.8)	(6.4)		
Warsaw	NY	6,078		(3.0)	7.2	6.2	11.0	(5.2)		(2.3)			

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Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Warwick	NY	9,725		2.6	9.3	3.3	6.2	3.7	(1.5)	2.3			
Watertown	NY	25,359	(1.2)	4.6	5.8	2.2	7.6	3.9	2.5	2.0	3.1	37.1	
Wellsville	NY	9,393		3.9	7.3	3.4	6.4	4.5	(1.2)	2.4			
West Islip	NY	50,963	(1.1)	4.6	13.3	2.0	5.9	3.2	1.7	3.0	2.2	49.4	1.1
Westfield	NY	3,901		(3.3)	10.0	(4.6)	6.9	(4.5)		(2.7)			
White Plains	NY	57,391	0.6	2.8	6.2	2.9	5.9	4.5	1.1	2.0	2.4	51.4	1.9
Yonkers	NY	46,500	(0.8)	2.8	10.3	2.0	4.7	2.8	1.5	3.1	3.2	43.7	(1.0)
Callicoon	NY	1,535			(13.3)								
Abington	PA	36,485	(0.8)	2.3	5.1	4.1	7.6	4.0	0.9	2.6	2.1	22.1	
Aliquippa	PA	4,973		(2.3)	8.7	(7.7)	9.3	(4.1)	(2.7)	(5.1)			
Allentown	PA	118,941	0.8	3.2	6.5	3.6	10.0	3.9	1.8	3.2	2.0	39.5	1.2
Altoona	PA	28,982		3.2	15.8	3.6	8.8	4.3	1.7	3.4	5.6	23.3	
Ashland	PA	3,660			15.2		8.3			(5.9)			
Beaver	PA	19,675	(1.6)	3.3	7.7	5.0	7.8	3.0	1.3	5.2	(3.3)	20.2	
Berwick	PA	10,935		3.3	7.2	2.5	9.9	4.3	(2.1)	3.0			
Bethlehem	PA	55,022	0.7	3.2	8.4	4.5	10.9	3.4	2.4	3.2	3.7	24.2	2.4
Bloomsburg	PA	10,234	(2.0)	2.7	5.8	3.8	8.7	3.4	(1.5)	3.3			
Braddock	PA	1,985			(15.9)		(7.8)						
Bradford	PA	11,965		3.5	8.4	5.2	9.0	3.8	3.0	2.0	(2.6)		
Bristol	PA	9,452		3.9	15.4	3.0	7.6	2.3	(3.6)	3.6			
Brookville	PA	9,416	(2.0)	4.1	11.7	3.7	8.2	2.3	(3.6)	3.6	(3.3)		(3.4)
Brownsville	PA	4,960		(3.2)	8.7	(3.1)	12.8	(3.2)	(3.2)	(3.8)			
Bryn Mawr	PA	46,950	(0.8)	2.1	9.6	3.2	8.8	4.8	1.2	2.4	3.9	51.9	(2.3)
Butler	PA	18,971	(1.3)	5.4	10.3	5.2	12.9	3.6	2.0	5.0	(1.7)	0.0	(1.7)
Coatesville	PA	20,717	(1.0)	4.0	10.0	6.1	8.2	4.6	1.9	3.7	(3.0)	27.3	(1.5)
Camp Hill	PA	51,934	0.7	3.3	7.3	6.8	12.0	4.4	1.1	2.5	2.1	38.8	0.8
Canonsburg	PA	8,379		3.3	7.4	6.9	11.4	3.4	(1.9)	6.7	(3.6)		
Carbondale	PA	11,620		5.8	8.4	3.5	10.0	2.6	(3.5)	2.8			
Carlisle	PA	30,389		3.7	7.1	4.8	10.8	3.5	2.1	3.2	2.2	44.7	(1.2)
Chambersburg	PA	45,936	(0.7)	4.3	12.8	3.8	11.2	3.7	1.6	5.5	2.6	11.2	2.2
Clarion	PA	10,729	(2.0)	3.3	6.6	4.8	8.8	3.4	(2.7)	4.5	(4.4)	0.0	
Clearfield	PA	14,615		4.0	18.0	5.0	7.9	2.8	3.3	4.4	(1.9)	0.0	
Coaldale	PA	12,043	(1.9)	3.2	7.8	3.3	12.3	3.3	1.7	3.3	(4.0)		
Connellsville	PA	5,656		(5.9)	12.3	(5.8)	8.5	(3.5)	(2.7)	(3.2)			
Corry	PA	5,780		(4.7)	10.3	3.9	9.4	(4.5)	(2.9)				
Coudersport	PA	7,128		(3.5)	8.2	2.6	7.9	3.4	(1.5)	(3.3)			
Danville	PA	13,342		2.1	5.2	2.5	6.8	2.4	2.1	3.3	(2.3)		
Darby	PA	14,015		3.0	8.1	2.0	6.7	4.1	(1.4)	4.1	(2.4)		

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For surgical procedures, hospital service areas with fewer than 26 expected cases are shown in parentheses in the table. All rates for HSAs with 10 or fewer cases during the study period are omitted.

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CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; TURP for BPH = transurethral resection of the prostate for benign prostatic hyperplasia; PSA = prostate-specific antigen

Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
Doylestown	PA	35,136	(0.8)	2.2	7.7	3.8	8.0	4.4	0.8	3.5	2.9	28.8	(1.6)
Drexel Hill	PA	26,237	(1.2)	2.9	8.9	2.1	7.8	3.0	1.9	3.6	2.5	50.4	(1.3)
Dubois	PA	17,272	(1.5)	3.3	12.5	6.3	8.4	3.9	2.2	1.9	(2.0)	0.0	
East Stroudsburg	PA	48,616	(0.7)	5.0	8.4	4.4	6.3	4.1	2.4	3.7	5.4	29.2	1.4
Easton	PA	50,109	(1.4)	4.1	8.7	3.8	7.9	3.9	1.9	3.7	6.2	31.5	2.2
Ellwood City	PA	5,336		(5.2)	10.2	(4.5)	7.0	(3.1)	(2.5)	(4.5)			
Ephrata	PA	19,950		4.7	7.9	7.1	11.0	3.5	1.6	2.5		11.1	
Erie	PA	62,086	0.8	4.3	10.9	4.5	7.0	3.6	2.4	3.1	1.9	40.5	1.0
Everett	PA	9,256		2.6	14.8	4.3	8.8	2.4	(1.5)	3.2	(8.6)		
Franklin	PA	19,689		4.7	9.9	4.5	10.0	4.7	2.8	3.6	(5.2)	0.0	
Gettysburg	PA	20,319		3.9	5.6	4.8	10.1	3.5	0.9	3.9	(1.5)	18.6	
Greensburg	PA	17,930		4.2	9.0	3.3	8.3	2.1	2.1	3.0			
Greenville	PA	13,632		3.9	9.0	4.9	9.3	5.6	3.1	4.7	(2.6)	0.0	
Grove City	PA	7,434		(5.4)	8.3	3.5	7.5	3.3	(2.3)	2.5			
Hanover	PA	30,494		2.5	4.9	4.3	11.5	4.0	1.5	2.5	0.9	9.7	
Harrisburg	PA	64,745	0.6	4.0	8.8	5.6	10.2	4.2	0.9	3.1	3.5	31.7	0.7
Hazleton	PA	32,925	(0.6)	4.0	9.4	2.3	8.0	3.3	1.5	4.5	1.8	17.1	
Hershey	PA	4,886		(3.5)	4.5	(5.5)	9.7	(3.8)		(2.3)			
Honesdale	PA	22,431	(1.5)	4.0	9.4	2.7	8.2	4.3	1.6	3.2	1.6	14.8	(1.9)
Huntingdon	PA	14,519	(1.3)	3.8	15.2	4.2	9.3	3.8	2.1	4.6	(5.8)		
Indiana	PA	12,532		3.9	10.7	4.3	8.3	2.9	2.1	3.3	(2.9)		
Jeannette	PA	13,036		4.6	13.8	3.5	6.4	3.8	2.8	3.7	(2.4)		
Jersey Shore	PA	4,523		(2.6)	4.4	(6.5)	7.1	(3.0)	(2.3)	(2.6)			
Johnstown	PA	29,403		3.4	17.2	5.2	9.8	3.4	1.6	2.6	3.7	18.3	(1.3)
Kane	PA	4,162		(3.2)	7.9	(4.9)	8.9	(3.7)	(3.4)				
Kingston	PA	15,401	(1.3)	4.9	6.3	3.2	8.8	3.4	3.0	3.8			
Kittanning	PA	9,283		4.7	9.4	4.8	9.1	4.4	(2.8)	4.3			
Lancaster	PA	140,358	0.9	3.8	7.4	7.0	10.6	4.0	1.9	3.1	1.5	15.3	1.9
Langhorne	PA	67,390	1.0	3.1	11.2	3.2	7.8	3.6	1.7	3.1	2.7	46.0	1.0
Lansdale	PA	26,172	(1.0)	2.5	5.9	3.9	9.3	3.3	1.0	3.3	1.9	40.9	
Latrobe	PA	13,561		4.3	12.8	3.9	7.5	2.5	1.8	3.4	(2.2)		
Lebanon	PA	49,153	(0.5)	4.9	13.4	3.9	9.7	4.7	1.9	3.4	2.1	18.7	1.9
Lehighton	PA	15,941	(1.4)	3.6	7.4	3.6	10.5	4.5	2.8	3.4	(2.3)	15.0	
Lewisburg	PA	23,825		2.3	4.6	5.6	9.2	3.9	1.9	4.2	1.9	21.7	
Lewistown	PA	19,145		5.0	7.6	6.3	9.7	3.7	1.8	3.8	(1.7)	0.0	
Lock Haven	PA	9,845		1.6	5.6	5.4	10.5	3.0	(2.8)	2.6	(3.1)		
McConnellsburg	PA	6,233		(2.7)	12.4	4.1	9.4	(3.4)		(4.0)			
McKees Rocks	PA	3,919		(4.7)	5.9	(4.2)	7.2	(3.1)	(4.3)	(3.9)			

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For surgical procedures, hospital service areas with fewer than 26 expected cases are shown in parentheses in the table. All rates for HSAs with 10 or fewer cases during the study period are omitted.

Specific codes used to define the numerators for rates, and methods of age, sex, and race adjustment, are included in the Appendix on Methods.

CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; TURP for BPH = transurethral resection of the prostate for benign prostatic hyperplasia; PSA = prostate-specific antigen

Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

HSA name	HSA state	Medicare beneficiaries (2008-10)	Mastectomy (2008-10)	CABG (2008-10)	PCI (2008-10)	Back surgery (2008-10)	Knee replacement (2008-10)	Hip replacement (2008-10)	Carotid endarter-ectomy (2008-10)	Cholecys-tectomy (2008-10)	TURP for BPH (2008-10)	Percent receiving PSA test (2010)	Radical prostatec-tomy (2008-10)
McKeesport	PA	14,702		4.8	7.8	4.5	6.5	2.8	2.1	3.6	(2.2)		
Meadville	PA	24,917	(1.1)	4.3	12.1	4.7	9.1	3.3	1.7	3.0	1.4	14.5	(1.7)
Media	PA	23,294	(1.6)	2.5	5.7	2.6	8.7	3.9	1.0	3.8	1.4	36.4	(1.8)
Meyersdale	PA	3,783		(6.8)	10.7	(5.0)	8.3		(3.6)	(3.4)			
Monongahela	PA	13,869		4.8	8.8	6.0	8.4	3.8	2.9	5.1	(2.2)		
Monroeville	PA	21,273		4.2	8.8	4.8	7.2	4.3	2.5	3.9	(1.4)		
Montrose	PA	4,971		(4.1)	7.5	(2.4)	9.2	(4.1)		(2.2)			
Mount Pleasant	PA	7,532		(5.9)	13.6	4.4	6.3	3.6	(2.6)	2.8			
Muncy	PA	9,503		2.6	4.4	5.2	8.3	3.0	(1.9)	1.4	(3.2)		
Natrona Heights	PA	15,339		4.3	6.1	3.9	9.4	4.2	1.5	3.5	(3.4)		
New Castle	PA	17,166		4.0	6.3	5.9	9.2	3.5	2.4	4.8	(3.6)	15.4	
New Kensington	PA	7,756		(3.8)	7.2	5.1	10.3	1.7	(1.5)	3.3	(3.6)		
Norristown	PA	47,941	(1.1)	2.5	7.7	2.8	9.1	4.0	1.6	2.6	3.3	45.9	1.7
Palmerton	PA	8,226		3.4	8.1	4.5	10.9	4.0	(3.3)	3.8	(3.0)		
Paoli	PA	18,737	(1.1)	2.5	9.3	3.3	8.3	3.9	2.1	3.2	(4.2)	47.4	(2.7)
Peckville	PA	2,249			(10.7)		(7.0)			(4.8)			
Philadelphia	PA	323,511	1.0	2.4	7.3	2.7	5.8	3.0	1.1	2.9	3.0	42.7	1.0
Philipsburg	PA	4,202		(3.4)	13.1	(5.9)	8.5	(2.9)	(3.0)				
Phoenixville	PA	17,642		3.5	7.6	3.7	7.9	3.7	1.9	3.7	(4.9)		
Pittsburgh	PA	193,113	0.8	3.4	7.6	5.2	8.1	3.9	1.4	3.5	2.7	24.3	0.8
Pottstown	PA	23,470		2.7	9.4	4.4	7.7	3.6	1.6	4.0	2.8	33.0	(1.9)
Pottsville	PA	45,327	(1.2)	3.3	8.5	3.0	8.6	3.4	3.3	4.8	2.7	25.4	(1.3)
Punxsutawney	PA	6,978		(4.3)	13.3	5.7	7.9	3.7		(4.4)			
Quakertown	PA	10,340		2.7	10.8	4.5	10.3	4.6	(2.0)	3.3	(3.1)		(2.5)
Reading	PA	105,189	1.1	3.0	9.3	3.7	11.0	3.8	1.6	2.9	3.2	15.9	1.3
Renovo	PA	1,335					(13.3)						
Ridgway	PA	4,969		(5.9)	11.8	(3.2)	10.2	(3.2)	(3.2)	(4.4)			
Ridley Park	PA	21,487		3.0	7.7	2.7	8.9	3.5	2.3	4.3	(2.3)	40.5	(1.4)
Roaring Spring	PA	5,017			18.9	(3.1)	7.3	(4.5)		(4.3)	(5.8)		
Sayre	PA	23,077	(2.4)	3.3	10.1	3.9	8.0	6.0	1.3	3.1	2.2	31.9	
Scranton	PA	87,218	1.2	4.3	9.5	3.3	10.0	3.3	2.1	3.1	1.6	25.5	1.5
Sellersville	PA	31,102	(0.8)	2.9	8.1	2.9	9.6	3.9	1.8	3.4	2.6	36.1	(1.3)
Sewickley	PA	15,623		2.9	7.3	5.5	8.7	3.7	1.8	4.8			
Shamokin	PA	7,857		2.3	5.8	2.2	7.3	2.7		4.7	(4.6)		
Sharon	PA	18,475	(1.3)	4.4	11.2	4.6	10.3	3.5	2.9	3.3	(2.8)	0.0	
Somerset	PA	8,881		3.5	13.9	5.4	7.3	3.8	(2.8)	5.0	(4.1)		
Spangler	PA	6,007		(2.4)	10.4	4.0	9.5	(2.9)		(3.4)			
St. Marys	PA	11,374		4.7	11.2	5.8	10.6	3.9	(1.3)	3.0	(2.8)		

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Appendix Table 2 (continued): Rates of common surgical procedures and PSA testing among Medicare beneficiaries in hospital service areas in the Middle Atlantic region

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State College	PA	22,250		2.2	5.0	5.5	9.9	4.5	1.3	3.8	1.6	15.5	(1.5)
Sunbury	PA	14,995		1.9	6.0	4.7	8.3	3.6	1.5	4.3	(2.1)	15.8	
Susquehanna	PA	5,433		(3.5)	9.5	3.0	10.1	(3.2)	(2.8)	(3.9)			
Titusville	PA	10,415		6.1	12.0	3.1	10.0	4.5	(2.6)	3.8	(7.3)		
Towanda	PA	9,008	(2.3)	5.0	11.2	4.7	6.5	3.8	(1.2)	3.1			
Tunkhannock	PA	7,395		5.1	10.1	4.3	9.9	4.0	(2.1)	(4.0)			
Tyrone	PA	4,065			18.0	(4.6)	9.1	(3.6)		(2.9)			
Union City	PA	2,138		(6.4)	(10.2)		(7.8)	(5.0)					
Uniontown	PA	20,579		5.8	9.6	3.9	8.8	4.0	2.4	3.7		26.4	(1.7)
Upland	PA	26,737	(1.4)	2.2	4.3	2.9	8.1	3.0	1.2	3.4	1.8	38.5	(1.4)
Warminster	PA	14,859		3.0	6.9	4.2	10.6	5.0	1.1	3.2	(3.2)		
Warren	PA	15,665		5.2	10.4	7.0	8.6	4.2	2.5	2.8	(1.6)	0.0	
Washington	PA	16,096		3.7	11.8	6.0	8.8	3.9	1.6	4.3	(2.1)		
Waynesboro	PA	19,168		3.7	11.6	4.5	9.8	3.6	2.0	3.3	(2.4)	16.2	(2.2)
Waynesburg	PA	8,157		3.6	12.6	3.5	8.6	5.0	(2.5)	3.3			
Wellsboro	PA	16,573		2.6	8.6	5.1	7.6	4.4	1.1	3.1	(3.7)	12.8	(2.3)
West Chester	PA	47,724	(1.1)	2.4	6.3	3.2	8.3	4.3	1.9	3.3	2.7	47.4	1.6
West Grove	PA	17,420	(1.4)	2.8	7.0	5.0	7.5	4.1	1.8	4.0	(2.3)	37.6	
Wilkes-Barre	PA	84,801	1.3	3.8	8.5	2.6	8.8	3.2	2.8	3.3	1.1	20.6	0.8
Williamsport	PA	31,678	(1.0)	2.0	4.9	6.0	11.2	3.8	2.2	2.6	3.1	12.9	(1.3)
Windber	PA	4,062		(4.6)	15.3	(7.0)	13.0	(3.9)		(3.3)			
York	PA	108,031	0.3	3.4	5.0	5.4	8.7	3.6	1.1	2.8	3.1	11.0	0.4
United States		83,578,984	0.9	3.4	8.2	4.7	8.8	3.8	2.1	3.4	2.7	34.5	1.4

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Appendix on Methods

The methods used in this report were developed over a number of years and have been described in detail in peer-reviewed publications and in previous editions of the Dartmouth Atlas. The data are drawn from the enrollment and claims data of the Medicare program and are restricted to the fee-for-service population over age 65; HMO patients are not included in our analysis. A brief overview of the approach and measures is provided here. For more information, please visit the Dartmouth Atlas web site (www.dartmouthatlas.org).

The Geography of Health Care in the United States

Defining hospital service areas

Hospital service areas (HSAs) represent local health care markets for community-based inpatient care. The definitions of HSAs used in the original edition of the Atlas have been retained in subsequent editions in order to provide continuity of the market areas. HSAs were originally defined in three steps using 1993 provider files and 1992-93 utilization data. First, all acute care hospitals in the 50 states and the District of Columbia were identified from the American Hospital Association Annual Survey of Hospitals and the Medicare Provider of Services files and assigned to a location within a town or city. The list of towns or cities with at least one acute care hospital (N=3,953) defined the maximum number of possible HSAs. Second, all 1992 and 1993 acute care hospitalizations of the Medicare population were analyzed according to ZIP code to determine the proportion of residents' hospital stays that occurred in each of the 3,953 candidate HSAs. ZIP codes were initially assigned to the HSA where the greatest proportion (plurality) of residents was hospitalized. Approximately 500 of the candidate HSAs did not qualify as independent HSAs because the plurality of patients living in those cities was hospitalized in other cities.

The third step required visual examination of the ZIP codes used to define each HSA. Maps of ZIP code boundaries were made using files obtained from Geographic Data Technologies (GDT) (now Tele Atlas) and each HSA's component ZIP codes were examined. In order to achieve contiguity of the component ZIP codes for each HSA, "island" ZIP codes were reassigned to the enclosing HSA, and/or HSAs were grouped into larger HSAs (see the Appendix on the Geography of Health Care in the United States at www.dartmouthatlas.org for an illustration). Certain ZIP codes used in the Medicare files were restricted in their use to specific institutions (e.g., a nursing home) or a post office. These "point ZIPs" were assigned to their enclosing ZIP code based on the ZIP code boundary map.

This process resulted in the identification of 3,436 HSAs. In most HSAs, the majority of Medicare hospitalizations occurred in a hospital or hospitals located within the HSA.

Defining hospital referral regions

Hospital referral regions (HRRs) represent health care markets for tertiary medical care. As defined in the 1996 Atlas, each HRR contained at least one HSA that had a hospital or hospitals that performed major cardiovascular procedures and neurosurgery in 1992-93. Three steps were taken to define HRRs.

First, the candidate hospitals and HRRs were identified. A total of 862 hospitals performed at least 10 major cardiovascular procedures (DRGs 103-107) on Medicare enrollees in both years. These hospitals were located within 458 HSAs, thereby defining the maximum number of possible HRRs. Further checks verified that all 458 HSAs included at least one hospital performing the specified major neurosurgical procedures (DRGs 1-3 and 484).

Second, we calculated in each of the 3,436 HSAs in the United States the proportion of major cardiovascular procedures performed in each of the 458 candidate HRRs in 1992-93. Each HSA was then assigned provisionally to the candidate HRR where most patients went for these services.

Third, HSAs were reassigned or further grouped to achieve (a) geographic contiguity, unless major travel routes (e.g., interstate highways) justified separation (this occurred in only two cases, the New Haven, Connecticut and Elmira, New York HRRs); (b) a minimum population size of 120,000; and (c) a high localization index. Because of the large number of hospitals providing cardiovascular services in California, several candidate California HRRs met the above criteria but were found to perform small numbers of cardiovascular procedures. These HRRs were further aggregated according to county boundaries to achieve stability of cardiovascular surgery rates within the areas. The process resulted in the definition of 306 hospital referral regions.

Surgical Procedure Rates

Surgical procedure rates represent counts of the number of inpatient procedures that occurred in a defined time period (the numerator) for a specific population (the denominator). The counts of discharges for specific procedures are based on the MedPAR files for the measurement years, 2008 to 2010. The denominators are the corresponding Medicare enrollee populations that were enrolled in Medicare Part A on June 30 of the measurement year. Patients enrolled in risk-bearing HMOs at any time during the year (HMO status = A, B or C) are excluded.

The procedure codes used in the MedPAR file are based on the International Classification of Disease, ICD-9-CM. Selection of procedure codes is based on review of the literature and/or consultation with clinical experts. Some rates are suppressed to meet CMS suppression rules for patient confidentiality. Rates with fewer than 26 expected events are suppressed because of low statistical precision.

Table 1. Codes Used to Define Procedures

Surgical Procedure	Procedure Code(s)	&/or Diagnosis Code(s)
General Surgery		
Mastectomy for cancer (female)	85.41, 85.43, 85.45, 85.47	174-174.9, excluding 233.0
Cholecystectomy	51.21-51.24	---
Cardiothoracic Surgery		
Coronary artery bypass grafting surgery (CABG)	36.10-36.19	---
Percutaneous coronary intervention (PCI)	00.66, 36.01-36.02, 36.05, 36.06, 36.07, 36.09	---
Orthopedic Surgery		
Back surgery	03.0, 03.02, 03.09, 03.6, 80.50-80.54, 80.59, 81.00-81.09, 81.31-81.39, 81.61-81.64, 84.60-84.69;	Excluding Dx codes 140-239.9, 324.1, 630-676, 720.0-720.9, 730-730.99, 733.1, 733.10, 733.13, 733.8, 733.81-733.82, 733.95, 805-806.9, 839-839.59, E800-E849.9: Sx codes 03.2-03.29
	03.93, 03.94, 78.50, 78.59, 78.60, 78.69, 78.90, 78.99, 84.51, 84.52, 84.58, 84.59, 84.80-84.85	With exclusions above and only with Dx codes = 353.9, 355.0, 355.9, 721.0-721.4, 721.42, 721.7-721.9, 721.90, 721.91, 722.0, 722.10, 722.11, 722.2, 722.4, 722.5, 722.51, 722.52, 722.6, 722.70-722.73, 722.80, 722.81, 722.83, 722.90-722.93, 723.0, 723.1, 723.8, 724.00-724.02, 724.09, 724.2-724.6, 724.70, 724.71, 724.79, 724.8, 724.9, 737.0, 737.1, 737.10, 737.19, 737.20, 737.3, 737.30, 737.32, 737.34, 737.39, 737.43, 737.8, 737.9, 738.4, 756.11, 756.12, 846.0, 846.1-846.3, 846.8, 846.9, 847.0, 847.2, 847.9
Hip replacement	81.51	Excluding 820-821.39, 996.4x
Knee replacement	81.54	---
Vascular Surgery		
Carotid endarterectomy	38.12	---
Urology		
TURP for BPH (male)	60.2, 60.21, 60.29	Dx slots 1-5 = 600x-601.4, 601.8, 601.9, 602x-602.1, 788.2-788.29, 788.4x
Radical prostatectomy (male)	60.5x	---

Adjustment of Rates

Surgical procedure rates are adjusted using the indirect method for age, sex, and race using the national Medicare population as the standard. Sex-specific population estimates are used for prostate and breast procedures. Although the majority of events occurred only once per person during the study period, we include multiple events to the same person to allow the rates to reflect total health care utilization.

Calculation of age, sex and race adjusted rates

Medicare procedure rates are adjusted using the indirect method for the following strata: sex, race (black, non-black), and age (65-69, 70-74, 75-79, 80-84, 85-99). The standard population is the U.S. Medicare population age 65 to 99 with Medicare Part A entitlement and no HMO enrollment during the measurement period. The expected counts within HSAs are computed using the stratum-specific crude rates in the standard population, weighting by the stratum-specific population. Observed and expected counts at the HSA level are summed to the HRR level. Indirectly standardized rates for HRRs are then computed from observed and expected counts. A detailed explanation of indirect adjustment is available from the Dartmouth Atlas web site.

PSA Testing Rates

Prostate-specific antigen (PSA) screening was measured in men age 68 to 74 using the Medicare Carrier and Outpatient files with Common Procedural Terminology (CPT) codes G0103 or 84153.[23] To capture those who had a PSA test for a presumed screening indication, men who had any history of prostate disease (prostate cancer, prostate surgery, or diagnosis of elevated PSA in the prior three years) or who had symptoms in the three months before a PSA test that might have triggered a suspicion of cancer according to diagnostic codes billed on visits and hospitalizations were excluded from the PSA measure. This algorithm has been previously validated.[24] Rates were adjusted for race using the indirect method.

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The Dartmouth Atlas Project works to accurately describe how medical resources are distributed and used in the United States. The project offers comprehensive information and analysis about national, regional, and local markets, as well as individual hospitals and their affiliated physicians, in order to provide a basis for improving health and health systems. Through this analysis, the project has demonstrated glaring variations in how health care is delivered across the United States.

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The Dartmouth Atlas
The Dartmouth Institute
for Health Policy and Clinical Practice
Center for Health Policy Research

Contact: Eva Fowler
202-261-2868 voice
202-331-7207 fax

www.dartmouthatlas.org

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The Dartmouth Atlas Working Group

Leadership

Elliott S. Fisher, MD, MPH, Dartmouth Atlas Co-Principal Investigator
David C. Goodman, MD, MS, Dartmouth Atlas Co-Principal Investigator
Jonathan S. Skinner, PhD, Senior Scholar
John E. Wennberg, MD, MPH, Founder of the Dartmouth Atlas
Kristen K. Bronner, MA, Managing Editor

Senior Authors and Faculty

John Erik-Bell, MD
Shannon Brownlee, MS
Julie P.W. Bynum, MD, MPH
Chiang-Hua Chang, PhD
Scott Chasan-Taber, PhD
Philip P. Goodney, MD, MS
Nancy E. Morden, MD, MPH
Thérèse A. Stukel, PhD
James N. Weinstein, DO, MS

Analytic and Administrative Staff

Elisabeth L. Bryan, BS
Thomas A. Bubolz, PhD
Donald Carmichael, MDiv
Julie Doherty, BA
Jennifer Dong, MS
Daniel J. Gottlieb, MS
Jia Lan, MS
Martha K. Lane, MA
Stephanie R. Raymond, BA
Sandra M. Sharp, SM
Jeremy Smith, MPH
Yunjie Song, PhD
Dean T. Stanley, RHCE
Andrew W.J. Toler, MS
Stephanie Tomlin, MPA
Abigail Underhill, AS
Rebecca Zaha, MPH
Weiping Zhou, MS

Design and Production

Jonathan Sa'adah and Elizabeth Adams

Informed Medical Decisions Foundation Clinical Evidence Team

Julie M. Beauregard, MLIS
Mary McNaughton-Collins, MD, MPH
Ruth D. Lipman, PhD
Colin Nelson
Chad Parmet
Diana L. Stilwell, MPH